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NOS. 4—9., VOL. XI.] *Price 3s. 6d.* **[APRIL—SEPT., 1899.**

The Essex Naturalist:

BEING THE

JOURNAL

OF THE

ESSEX FIELD CLUB.

EDITED BY

WILLIAM COLE, F.L.S., F.E.S.,

Honorary Secretary and Curator.

Contents.

	PAGE
History of Essex Botany. By Prof. G. S. Boulger, F.L.S., F.G.S. (*In Progress.*)	57
Report of Club's Delegate at the Meeting of the Corresponding Societies' Committee of the British Association at Dover, September, 1899. By T. V. Holmes, F.G.S.	68
Notes on the occurrence of the White-tailed Eagle and the Salmon at Harwich in 1666. By Miller Christy, F.L.S.	76
Yardley Hill, the Latest Addition to Epping Forest. (*With two illustrations.*)	78
The After-Effects of the High-Tide of November 29th, 1897.	83
On the Local Extinction and Diffusion of Molluscs in Essex. By J. French.	86
A Supposed Neolithic Settlement at Skitts Hill, Braintree, Essex. By the Rev. J. W. Kenworthy. With remarks on the Archæological Objects by F. W. Reader; on the Geology of the District by T. V. Holmes, F.G.S.; and on the Osteological Specimens by E. T. Newton, F.R.S. (*With three Plates and nineteen other illustrations.*)	94
The Occurrence in Essex of a Species of Isopoda new to Britain (*Porcellio ratzburgi*). By W. M. Webb, F.L.S.	127
The Essex Field Club. Garden Party at Knighton, 128; Visit to Yardley Hill, 129; Voyage on Lea from Hertford to Waltham Abbey, 130	128
Short Papers:—Random Notes by an Old Angler on the Lea and its Fishes. By Mark Davies, 133; Rye House, 1685. By B. Winstone, M.D., F.C.S., 135; "Walton's Favourite River." By E. A. H. Bramley, ...	133
Notes—Original and Selected	141

(Title and Index to Volume X. inserted.)

The authors alone are responsible for the statements and opinions contained in their respective papers.

PUBLISHED BY THE CLUB, BUCKHURST HILL, ESSEX.

Ent. Stationers' Hall.]

Communications *and* Advertisements *should be addressed:*—
The Editor of "THE ESSEX NATURALIST,"
7, Knighton Villas, Buckhurst Hill, Essex.

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In order to encourage new members of the Club and others to complete their sets, the Council has resolved that for a very limited time only, the cost of the set of 10 volumes of the Essex Naturalist (1887-1898), now priced at £5 os. 6d. (unbound), shall be reduced to £2 to the public and £1 10s *to Members*. And that single volumes and parts (*so far as they can be supplied* of the "Transactions," "Proceedings," and "Essex Naturalist" shall be sold (*to Members only*) at one-fourth the published price.

HISTORY OF ESSEX BOTANY.

By Prof. G. S. BOULGER, F.L.S., F.G.S., *Vice-President.*

PART I.

THE BOTANISTS OF THE SIXTEENTH AND SEVENTEENTH CENTURIES.

A CLUB such as ours, the object of which is to record the Natural History of a county, must be interested in the gradual introduction of new plants and animals into the area it investigates, and in the growth of our knowledge concerning them. My present object is in the main the growth of our knowledge of the Essex Flora. It may be possible to some extent to separate the indigenous plants of the county from those introduced by man, and to discover approximately the dates of these additions to our objects of study. This I propose doing, on the lines of the valuable appendices in Mr. Gibson's *Flora*, in the fourth part of my paper. Perhaps also a good deal of matter of biographical interest might be collected with reference to botanists resident in Essex, whose work did not relate to the county; but, as I thought it advisable to limit my enquiry, it is a history of Essex Botany rather than of Essex plants, or of Botany in Essex.

It may be a subject of congratulation to us that this history of Essex Botany is conterminous with that of the science in Britain generally. We are not now concerned with plants that may have have been introduced by Romans in the first century, by the missionaries in the seventh century, by Normans in the eleventh century, or by the monks during the following five hundred years,[1] nor with any records previous to the revival of learning in the sixteenth century. The history of Essex Botany begins with William Turner, justly styled "the Father of English Botany," for, though we have no distinct statement that Turner was ever himself in the county, he mentions four species as growing in Essex, and most of his records, unlike those of his successors, seem to have been the result of personal observation. Commencing then with Turner, I find that our subject divides itself chronologically into three divisions: first, the botanists of the sixteenth and seventeenth centuries, Turner, Gerard, Johnson, Parkinson, How, Robert Turner, Merrett, Ray,

1 See "The Influence of Man upon the Flora of Essex," *Trans. Essex Field Club* iv., p. 13.

Morison, and Dale; secondly, those of the eighteenth century Blackstone, Thomas Martyn, Warner, Curtis and Robson, down to the year 1789, in which Gough's edition of Camden's *Britannia* was published, containing a list of Essex plants drawn up by the brothers Forster; and thirdly, the writers from that time, chiefly Edward Forster, George Stacey Gibson, and botanists recently deceased, or still living.

It is unnecessary for me to give a detailed biography of William Turner, for two such have already appeared of late years—one in Messrs. Trimen & Dyer's *Flora of Middlesex*,[2] pp. 364-8, the other yet more complete in Mr. B. D. Jackson's *fac-simile* reprint of the *Libellus de re herbaria novus*.[3] Turner was born at Morpeth, in Northumberland, probably between 1510 and 1515, and was educated at Pembroke Hall, Cambridge; was B.A. in 1529-30, Fellow of his college in 1531, M.A. in 1533. In 1538 he published his *Libellus de re herbaria novus*,[4] the earliest work meriting the title of botanical issued in England. It does not refer more than ten plants to county habitats, and these, with the exception of one Norfolk record, are all in Northumberland or Cambridgeshire. Having adopted the principles of the Reformation, he travelled through a good part of England preaching, was imprisoned, apparently for doing so "without a call," and subsequently banished. He passed a considerable time in Italy, studying Botany at Bologna, under Luca Ghini; took the degree of M.D., probably at Ferrara; visited the great Gesner at Zurich, and resided at Basel and Cologne. He issued various controversial religious pamphlets, and received money in common with other exiles, from his Cambridge friend and master in Greek, Nicholas Ridley. He returned to England in 1547, after travelling in Holland, and in 1548 published his second botanical work, *The names of herbes in Greke, Latin, English, Duch and Frenche, wyth the commune names that Herbaries and Apotecaries vse*, which rare and valuable little work has been admirably reprinted for the English Dialect Society, under the editorship of Mr. James Britten.[5] It is dated from Syon, where he acted as physician to the Protector Somerset, and contains about sixty county records, nearly half of which are in Middlesex, chiefly

2 London (Hardwicke), 1869, 8vo., price 10s. 6d.

3 London, privately printed, 1877, 4to.

4 British Museum press-mark $\frac{7.2.3.5}{2}$ f. 7. 4to. Mr. Jackson's reprint, London, 187 privately printed.

5 London (Trübner), 1881, 8vo., price 6s. 6d.

about Syon, and none referring to Essex. In 1550 Turner was appointed Prebendary of York, and soon after Dean of Wells, being at the same time incorporated M.D. at Oxford. He was only ordained priest in 1552, by Ridley. In 1551 he published the first part of his *Herball*, but having to take to flight on the accession of Mary, the second part and the complete work in three parts[6] appeared at Cologne in 1562 and 1568 respectively. They thus had the benefit of the woodcuts made for Fuchsius' octavo herbal of 1545, which probably belonged at that time to Arnold Birckman. In this Herbal of Turner's appear the first Essex records I have. They refer to *Ruscus aculeatus*, L., a *Tilia*, a Hellebore, probably *Helleborus viridis*, L., and to the Misseltoe (*Viscum album*, L.). Thus it happens that the little Butchers' Broom, which is so frequent in the Forest and in our other woodlands, is the first scientifically recorded Essex plant, and, as all four of these species occur in the second part of the Herbal, Essex Botany dates from 1562—exactly three centuries before the publication of Mr. Gibson's *Flora*. These four records of Turner have considerable botanical accuracy and interest.

"Ruscus," he says, "is named in Greke myrsine agria, that is myrtus sylvestris, in Barbarus latin bruscus, in English kneholme, or knehull,[7] and of other Bucher broume, and of som Petigre. I never sawe it in Germany, therefore I know not the Dutche name of it. Ruscus called of Dioscorides Myrtus sylvestris hath a leafe lyke unto a myrtell tree, but broder, lyke in fashon unto a lance, sharp in the top. It hath a rounde fruyte in the middes of the lefe rede, when it is ripe with a harde kirnel within. The twigges are bowing lyke vinde braunches, which come out of the route, they are tough a cubit high, full of leaves, the routes are lyke unto grasse binding, tarte in taste and somthing bitter. This bushe groweth verye plenteously in Essex and in Kent, and in Barke shyre, but I could never se it in Germany."[8]

There is a figure of the plant annexed. He also gives (on p. 153) a very poor figure of a lime tree, with this text:

"Tilia is named in Greke philyra, in Duche ein Linden baume, in English a Lind tre. It groweth very plentuously in Essekes in a parke within two mile from Colichester, in the possession of one maister Bogges, it is also very comon in high Germany and it groweth so far abrode ther that men set tables aboue in it, whereof som are so long that ten men maye sit well at one table, and yet roume remaynyng inough for many other besyde the table."

Ray points out that Turner was in error in terming the species now known as *Tilia vulgaris*, Hayne, a native of Essex[9];

6 Cologne, 1568, fol. British Museum press-mark, 447.g.2.

7 Still so called at Baddow.

8 Op. cit. part ii., p. 120. Previously recorded as English in the *Libellus* and from Kent in the *Names of Herbes*.

9 Ray. *Historia Plantarum*, II. p. 1694.

but he may here refer to *T. platyphyllos*, Scop.,[10] and as usual takes no care to distinguish between indigenous and planted species. This is the earliest record of the genus in Britain.

What I take to be a record of *Helleborus viridis*, L., has no figure to it, and runs as follows (p. 160):

"I dare not saye that ever I founde the righte black Hellebor, but thys I dare holde, that a man for defaut of it, maye use verye well that kinde of bear foot that goeth every yeare into the grounde, whereof groweth greate plentye in a parke besyde Colchester, and in the west parke besyde Morpeth."

In this determination I differ, on the grounds of *Helleborus viridis* both being wild and having annual stems, from Pulteney, who in his MSS. considers *H. fœtidus*, L., to be referred to,[11] and from my friend Mr. B. D. Jackson, who in his edition of the *Libellus* (p. 12) amends his reference (p. 3) to *Veratrum nigrum*, L. of a plant "quam vulgus cantabrigiense vocat Bearefote" by referring it to *Helleborus niger*, L. I probably should also dissent from Mr. Britten's reference of the Bearfot or Consiligo of the *Names of herbes* to this latter exotic species.[12] The true explanation appears in Mr. Jackson's edition of Gerard's Catalogus,[13] p. 36.[14]

On pp. 164-5. Turner gives the following interesting record of the mistletoe, with a very good figure of the plant.

"The best missel byrde lyme is . . . made of a certayn round fruyte that groweth in an oke, the leafe of the bushe, that beareth it, is lyke unto boxe. It groweth also in apple and crab trees and peare trees and other trees and somtyme at the rootes of som bushes. . . . This Missel doth grow no other wayes, but by ye sede in such places whereas byrdes have devoured the fruyt, and have [discharged it] in the tre. I never sawe more plentye of righte oke miscel, then Hugh Morgan shewed me in London. It was sente to hym oute of Essex: where as there is more plentye then in anye place of Englande that I have ben in."

10 Gerard gives a similar record (*Herball*, 1597, p. 1299): "Neare Colchester, and in many places alongst the highway leading from London to Heningham, in the Countie of Essex." Ray's correction runs as follows:—Turnerum & Gerardum errasse existimo cum in Essexia Angliæ hoc genus copiosè provenire aiunt, nam quamvis ipse Essexiæ incola sum, neque inibi neque alibi in Anglia Tiliam fœminam vulgarem platyphyllon sponte nascentem vidi. Quæ frequens in sepibus & sylvis apud nos invenitur Tilia est minore folio J.B. & aliorum." The frequency of this small-leaved Linden round Black Notley was noticed during our Field Meeting, 23rd July, 1898. The identity of the species, hitherto known as *T. cordata* Miller, *T. parvifolia* Ehrhart, or *T. ulmifolia* Scopoli, has been recently established by Mr. E. G. Baker (*Journal of Botany*, 1898, pp. 318-9).

11 *Flora Anglica abbreviata*, MS. in the Botanical Department, British Museum, gen. 760.

12 Op. cit. p. 94.

13 *A Catalogue of plants cultivated in the garden of John Gerard.* . . edited with . . a life of the author by B. D. Jackson (privately printed), London, 1876. 4to.

14 Mr. W. A. Clarke, F.L.S., in his *First Records of British Flowering Plants*, London, 1897. p. 7, also refers this record to *H. viridis*.

Though we now generally look on the apple orchards of the western counties as the main home of the misseltoe, there is still plenty in Essex, growing on a variety of trees, including, according to Mr. Gibson and his correspondents, the apple, elm, lime, sloe, willow and thorn; but, so far as I know, no longer on the oak in this county. Yet in 1771 Warner records it,[15] not only on apple, pear, ash, lime, willow and elm, but

"On an oak, between Woodford Row and The Bald Faced Stag, near the the Ten Mile Stone: and on several trees, many of them oaks, between Loughton and Mr. Conyers's, Copped Hall."

This suggests ideas connecting the Forest not only with the Romano-British period of Ambresbury Banks—but with the pre-Christian days of Druidism.

Having returned to England at the accession of Elizabeth in 1558, Turner was reinstated in his Deanery, but in 1564 was suspended for nonconformity, in declining to adopt the prescribed ecclesiastical vestments. He then took up his residence in London, where he died in 1568, and was buried in St. Olave's, Hart Street.

In accordance with my intention of restricting this history to the workers in Essex Botany, I need do no more than mention Thomas Newton, a native of Presbury, Cheshire, who, after practising as a surgeon, became a schoolmaster at Little Ilford, and, in 1583, Rector of that parish. In 1587 he published *An Herball to the Bible*, translated from the Latin of the Dutch physician, Levinus Lemnius. Newton died at Little Ilford in May, 1607, and was buried in Ilford Church. (Pulteney, *Sketches of the Progress of Botany*, i., 108; Britten and Boulger, *Biographical Index*, 127.)

Essex Botany, however, owes far more than to Turner to the better known Elizabethan worthy, John Gerard. Here again Mr. B. D. Jackson's labours, in the work already quoted, render any detailed biography from me superfluous. John Gerard was born at Nantwich, in Cheshire, in 1545, was educated in a neighbouring school, was drawn at an early age to the study of medicine, and travelled, possibly as surgeon on a merchant vessel, in Demark, Sweden, Poland, and Russia. In 1577 he had charge of the gardens of Lord Burleigh, in the Strand, and at Theobalds in Hertfordshire, and either at this time or subsequently he seems to have practised as a Barber-Surgeon.

15 *Plantæ Woodfordienses*. London, Printed for the Author. 1771. 8vo.

In 1595 he was elected a member of the Court of Assistants of the Barber-Surgeons, and about this time he seems to have had a house and garden in Holborn, probably near Fetter Lane, the north side being occupied by the garden of Ely House, afterwards Sir Christopher Hatton's. In 1596 Gerard issued a catalogue of the plants growing in this garden, of which he issued a second edition in 1599, both editions having been edited in a most workmanlike manner by Mr. B. D. Jackson, to whom I am most deeply indebted for assistance of all kinds. In 1597 Gerard became Junior Warden of the Barber-Surgeons' Company, and issued his *Herball*,[16] which is virtually an adaptation to England of the *Pemptades* of Dodoens (1583). Previous to the appearance of this Herbal there had appeared the *Stirpium Adversaria* of Pena and Lobel (1570) and the *Herbal*, translated from Dodoens by Henry Lyte (1578), both containing localities; but those of the latter work are mainly from the Dutch original or copied from Turner, whilst none of those in the former happen to be in Essex. Gerard's *Herball* contains more than 1,800 woodcuts, nearly all of which were those used in the *Eicones Stirpium* of Tabernæmontanus (1590), obtained from Frankfort for the purpose by the printer, Norton. In 1604 Gerard received a royal grant of a garden plot containing about two acres to the east of Somerset House, Strand, but in the following year he parted with his lease to Robert Cecil, Earl of Salisbury. In 1608 he became Master of the Barber-Surgeons' Company, but in February, 1612, he died and was buried in St. Andrews', Holborn. The *Herball* enumerates about 75 plants from Essex, of which two or three are escapes from cultivation, about as many seem to be blunders, and the record of *Ruscus* is taken from Turner. Of the rest some cannot be determined with certainty, but in the first appendix to his *Flora* Mr. Gibson only enumerates the following 43 species as first mentioned by Gerard :—

Clematis vitalba.
Myosurus minimus.
[*Sisymbrium polyceratium.*]
Crambe maritima.
Althæa officinalis.
Tilia parvifolia.
Hypericum androsæmum.
Melilotus officinalis.
Cynoglossum montanum.
Linaria elatine.
L. spuria.
Lamium galeobdolon.
Galeopsis ladanum.
Anagallis cærulea.
Glaux maritima.
Statice limonium.

16 John Gerard. *Herball.* London. 1597.fol. 449.k.4.

Trifolium fragiferum.
Astragalus glycyphyllos.
Comarum palustre.
Rosa spinosissima.
Eryngium maritimum.
Peucedanum officinale.
Dipsacus pilosus.
Aster tripolium.
Solidago virgaurea.
Diotis maritima.
[*Senecio saracenicus.*]
Serratula tinctoria.
Campanula glomerata.
Convolvulus soldanella.
Plantago maritima.
Euphorbia paralias.
Paris quadrifolia.
Listera ovata.
Epipactis latifolia.
Asparagus officinalis.
Convallaria majalis.
Ruscus aculeatus.
Actinocarpus damasonium.
Sagittaria sagittifolia.
Osmunda regalis.
Botrychium lunaria.
Ophioglossum vulgatum

Of these *Ruscus aculeatus* and *Tilia parvifolia* (*T. platyphyllos*) were previously recorded by Turner. *Anagallis cærulea* and *Actinocarpus damasonium* are not in Gerard's work, but occur for the first time in Johnson's "emended" edition (1633); *Sisymbrium polyceratium* is certainly not indigenous and *Senecio saracenicus* is, as Johnson points out,[17] probably a blunder. Mr. Gibson's *Appendix* professedly includes only the less common species. In the body of the *Flora*, the following 10 additional records from Gerard are alluded to; but unfortunately Mr. Gibson does not distinguish his quotations from Gerard's own work from those taken from Johnson's additions:—

Glaucium luteum.
Cochlearia anglica.
Matthiola sinuata.
Saxifraga granulata.
Scabiosa succisa.
Gentiana cruciata.
Plantago Coronopus.
Populus alba.
Crocus sativus.
Poa annua.

Of these *Matthiola sinuata* and *Gentiana cruciata* are probably blunders. In addition to these 53 species, I find about 20 other Essex records in Gerard's original work, including:—

Lepidium latifolium L.
Coronopus procumbens Gilib.
Thlaspi arvense, L.
[*Lunaria biennis.*]
Sherardia arvensis L.
Pulicaria dysenterica Gaertn.
P. vulgaris Gaertn.
Digitalis purpurea L.
Prunella vulgaris L.
Atriplex laciniata L.
Gyrostachis autumnalis Dum.
Scilla festalis Salisb.
Scolopendrium vulgare Symons.
Asplenium marinum L.

17 Gerard's Herbal "emaculatus," p. 275.

There is also an elm, probably *Ulmus montana* Stokes, what is probably *Angelica sylvestris* L., two or three species of Flax, and "five kindes of Cuckowe flowers or Ladie smockes."

About 17 of Gerard's Essex records seem to be the first British notices of the species, viz. :—

Mathiola sinuata R.Br.
Althæa officinalis L.
Melilotus officinalis Lam.
Potentilla palustris Scop.
Rosa spinosissima L.
Diotis candidissima Desf.
Statice limonium L.
Cynoglossom germanicum Jacq.
Atriplex laciniata L.
Populus alba L.
Cephalanthera ensifolia Rich.
C. pallens Rich.
Asparagus officinalis L.
Convallaria majalis L.
Poa annua L.
Asplenium marinum L.
A. ruta-muraria L.

Nearly all the species are illustrated by figures, some quite indistinguishable, others wrongly assigned, but some remarkably good. As Gerard's *Herball* is now a rare work, and a good deal of interest attaches to these early records and the identification of the species intended, I propose transcribing all the passages referring to Essex plants, adding modern names and a few notes. They run as follows:—

p. 4. "Gramen minimum album. The white Dwarfe grasse . . . . doth grow very plentifully among the hop gardens in Essex." [*Poa annua* L.]

Hops are still much grown in the Colne valley, and *Poa annua* is still a common weed.

p. 100. "Hyacinthus albus Anglicus. White English Hare-bels or Iacint and . . . another sort which hath flowers of a faire carnation colour . . grow in the woods by Colchester in Essex." [*Scilla festalis* Salisb.]

p. 124. "Common, or the best knowne Saffron groweth plentifully in Cambridgeshire, Saffron Walden and other places thereabout, as corne in the fieldes." [*Crocus sativus* L.]

p. 168. "Orchis Frisia & Orchis Leodinensis, Friezland Ladie traces and Liege Ladie traces . . . The yellow kinds growe in barren pastures and borders of fields about Ouenden and Clare in Essex. Likewise neere unto Muche Dunmowe in Essex, where they were shewed me by a learned gentleman master James Twaights, excellently well seene in the knowledge of plants." *Gyrostachis autumnalis* Dum.]

p. 187. "Dittander is planted in gardens, and is to be found wild also in England in sundrie places, as at Clare by Ouenden in Essex." [*Lepidium latifolium* L.]

p. 198. "Erysimum sylvestre, Wilde bancke Cresses, with leaves like Dandelion, . . . I found it growing at a place by Chelmesforde in Essex called little Baddowe."

This would be *Sisymbrium polyceratium* L., but Johnson says:—[18]

"If our Author meant this which I have described and given you the the figure of (as it is probable he did), I doubt he scarce found it wilde."

p. 249. "Brassica marina Anglica. . . The sea Colewoort groweth naturally vpon the bayche and brims of the sea, where there is no earth to bee seene, but sand and rowling pibble stones, which those that dwell neere the sea doe call Bayche: I found it growing . . . in many places neare Colchester." [*Crambe maritima* L.]

p. 257. "*Atriplex marina* . . . certaine Orache . . . I have found in our owne country, neere the sea side . . . it groweth by the blockhouse of Tilberie." [*Atriplex laciniata L.*]

Johnson (p. 325) suppresses this locality, without comment.

p. 278. "Thorne apples . . . The iuyce of Thorne apples boiled with hogges grease to the forme of an vnguent or salve, cureth all inflammations whatsoeuer, all manner of burnings or scaldings, as well of fire, water, boyling leade, gun-powder, as that which comes by lightning, and that in very short time, as my self have found by my dayly practise, to my great credit and profit. The first experience came from Colchester where Mistresse *Lobel* a Merchants wife there being most grieuously burned with lightning, and not finding ease or cure in any other thing, by this found helpe when all hope was past, by the report of Mr. *William Ramme*, publique Notarie of the said towne, was perfectly cured. [*Datura stramonium* L.]

p. 295. "The yellowe horned Poppie. Papauer cornutum flore luteo . . groweth vpon the sandes and bankes of the sea: I found it growing . . . at Lee at Essex: at Harwich." [*Glaucium flavum* Crantz.]

p. 324. "*Cochlearia Britannica*. Common English Scurvie-grasse . . . groweth in diuers places vpon the brims of the famous riuer Thames, as at Woolwich, Erith, Greenhithe, Grauesend; as well as on the Essex shore." [*Cochlearia anglica* L.]

p. 326. "*Ophris Bifolia*. Twaiblade . . . groweth in moist medowes, fennie grounds and shadowie places. I haue found it in many places, as . . in the woods by Quenden neere to Clare in Essex, and in the woods by Dunmow in Essex." [*Listera ovata* R. Br.]

p. 327. "*Ophioglosson*. Adder's toonge . . groweth in moist medowes throughout most parts of Englande, as . . . in the fieldes in Waltham forrest." [*Ophioglossum vulgatum* L.]

18 Op. cit. p.254.

p. 328. "*Herba Paris*. One Berrie, or herbe Truelove . . groweth pentifully in all these places following, that is to saie, in Chalkney woode neere to wakes Coulne, seauen miles from Colchester in Essex; . . in the parsonage orcharde at Radwinter in Essex, neare to Saffron Walden; . . in Bocking parke by Braintree in Essex." [*Paris quadrifolia* L.]

p. 329. "*Lunaria minor*. Small moonewoort . . groweth also in the ruines of an olde brickekill by Colchester, in the grounde of master *George Sayes*, called Miles ende." [*Botrychium lunaria* Sw.]

p. 332. "*Lilium conuallium*. Conuall Lillies . . or Lillie of the Vally . . groweth . . neere to Lee in Essex." [*Convallaria majalis* L.]

p. 333, "*Limonium*. Sea Lauander spike . . groweth . . in the salt marshes by Lee in Essex : in the Marsh by Harwich, and many other places." [*Statice limonium* L.

Gibson remarks ("Flora," p. 253) that "Gerard's figure seems quite as like *S. bahusiensis*," *i.e. S. variflora* Drejer.

p. 333. "*Tripolium vulgare*. Sea Starwort . . There is another kinde of Tripolium like the first, but much smaller, wherein consisteth the difference. . . These herbs grow plentifully along the English coastes in many places, as . . in a marsh which is vnder the towne wals of Harwich, in the marsh by Lee in Essex." [*Aster tripolium* L.]

p. 337. 1. *Sagittaria major*. Great Arrowe head. 2. *Sagittaria minor* Small Arrowe head. 3. *Sagittaria minor angustifolia*. Narrow-leafed Arrow head. . . These herbes do grow in the watrie ditches . . by Chelmesford in Essex. [*Sagittaria sagittifolia* L.]

Gerard's three names refer only to variations which commonly occur in the arrow-shaped leaves of this species, without reference to the grass-like submerged leaves and the ovate unbarbed floating ones that also occur.

p. 343. "*Plantago maritima*. Sea Plantaine . . doth growe neere vnto the sea side in all the places about Englande where I have trauelled, especially by the fortes on both sides of the water at Grauesend; . . at Lee in Essex." [*Plantago maritima* L.]

p. 346. "*Cauda Muris*. Mousetaile . . groweth . . in Woodford Row in Waltham forrest, and in the orchard belonging to Master *Francis Whetstone* in Essex." [*Myosurus minimus* L.]

p. 346. "1. *Cornu Ceruinum*. Hartes horne. 2. *Coronopus Ruellij*. Swines Cresses, or Buckshorne . . growe . . at Waltham, twelve miles from London." [*Plantago coronopus* L. and *Coronopus procumbens* Gilib.]

p. 347. "Saracens Consound. *Solidago Saracenica* . . groweth by a wood, as yee ride from great Dunmowe in Essex, nto a place called Clare in the saide countrey; from whence I brought some plants into my garden."

This should refer to *Senecio saracenicus* L.; but under *Arabis*

quorundam of Camerarius, which would seem, as Mr. Jackson points out,[19] to be *Sisymbrium strictissimum* L., Johnson says:—[20]

"Without doubt this is the very plant that our Author mistooke for *Solidago Sarracenica*, for he bewraies himselfe in the chapter of *Epimedium* whereas he saith it has cods like Sarracens Consound; when as both he, and all other giue no cods at all to Sarracens Consound. My very good friend Mr. John Goodyer was the first, I thinke, that obserued this mistake in our Author."

At the same time *Sisymbrium strictissimum* is neither British, nor very likely to have occurred at Dunmow.

p. 349. "Virga aurea. Golden Rod" and "Virga aurea Arnoldi Villanouani. Arnold of the new towne his Golden Rod. . . They both growe plentifully . . in a wood by Rayleigh in Essex." [*Solidago virgaurea* L.]

On the second of these forms Messrs. Trimen and Dyer write:—[21]

"A dwarf form was distinguished by the old botantists. Gerarde calls it *V.-a. Arnoldi Villa novani*, and both he and Johnson mention it in Hampstead Wood. It is probably *V.-a. vulgari humilior* (R. Syn. iii. 176) on Hampstead Heath; Huds. i. 319; and nearly answers to Smith's *var Cambrica*."

p. 352. "*Gentiana minor Cruciata* . . Crossewoort Gentian groweth in a pasture at the west ende of little Rayne in Essex, on the north side of the waie leading fram Braintrie to much Dunmow; and in the horse way by the same close." [*Gentiana cruciata* L.]

This error, as it almost certainly is [Gibson p. 205] may have arisen by a slip for *Blackstonia*, *Erythræa* or *Galium cruciata* Scop.

p. 358. "*Helleborine*. Wilde white Hellebor . . groweth . . in the woods of Dunmowe in Essex: . . in a little groue of Juniper, and in a woode by Clare in Essex." [*Cephalanthera pallens* Rich.]

p. 365. "*Trachelium minus*. Small Canterburie bels . . groweth . . in Hennyngham parke in Essex." [*Campanula glomerata* L.]

p. 376. "Of Sea stocke Gilloflowers." "These plants do growe neere vnto the Sea side, about Colchester."

Gerard enumerates no less than five kinds. Johnson (*op. cit* p. 461) doubts whether any except perhaps *Leucoium marinum purpureum L'Obelij* have been found wild. Gibson in the "Additions and Corrections" to his *Flora*, p. 456, rightly identifies this one species with *Mathiola sinuata* R.Br., at the same time pointing out that it "is probably a mistake" to have recorded it for Essex.

19 *Catalogue of plants . . in the garden of John Gerard*, p. 51.
20 Gerard emac. p. 275
21 *Flora of Middlesex*, p. 150.

p. 377. "*Viola Lunaria siue Bolbonac.* White Sattin . . hath beene founde wilde . in Essex . . about Hornchurch." [*Lunaria biennis.*]

p. 401. "*Tithymalus paralius.* Sea Spurge . . groweth by the sea side vpon the rowling sande and baich, as at Lee in Essex, at Langtree point right against Harwich." [*Euphorbia paralias* L.]

p. 455. "*Clymenon Italorum.* Tutsan or Parke leaues . . groweth . . in a wood by Railie in Essex." [*Hypericum androsæmum* L.]

p. 447. "Of Wilde Flaxe . . The third and fourth growe vpon rocks and cliffes neere to the sea side. I haue seene them growe upon the sea bankes by Lee in Essex." [*Linum angustifolium* Huds. and, probably, L. *catharticum* L.]

[*To be continued.*]

REPORT OF THE CLUB'S DELEGATE AT THE MEETING OF THE CORRESPONDING SOCIETIES' COMMITTEE OF THE BRITISH ASSOCIATION AT DOVER, SEPTEMBER, 1899.

THE meetings of the Conference were held in the Mayor's Parlour at the Town Hall, Dover, on Sept. 14th and 19th, at 3 p.m. A brief report, which was taken as read, was in the hands of every delegate on the 14th. In it the Corresponding Societies' Committee of the British Association expressed their pleasure at being able to state that the resolution passed at the Bristol Conference of Delegates last year, on the desirability of securing the co-operation of the Coast Guard, in making systematic observations on Coast Erosion, had been adopted by the Council of the Association, and favourably received by the Admiralty. Forms, drawn up by a Committee of the Council of the Association, which had been appointed to consider the subject, have been issued by the Admiralty, and many have already been returned, filled in by the Coast Guard. Of course the object of these forms is to promote uniformity in the nature of the observations made, and to direct attention to those points which most need to be noted. As it is in the highest degree desirable that observers belonging to the local scientific societies should know what kind of information is most required—the services of the Coast Guard being designed to supplement, not to supersede, their own—copies of Forms I. and II. are here given :—

FORM No. I.]

OBSERVATIONS OF COAST CHANGES.

[*To be filled in and returned as soon as convenient.*]

Instructions to Observers in regard to Changes that are taking place along the Coast-line of the British Isles.

1. Mention the part of the coast on which you report, and give its limits.

2. State whether the coast is cliffy or low; whether rocky, sandy, gravelly, or muddy. If it is cliffy, give the average height of the cliffs, and, if possible, the nature of the material of which they consist, especially whether hard rock, chalk, clay, &c. State also the nature of the beach.

3. What is the vertical range of ordinary spring-tides?

4. Is the sea encroaching on the coast? If so, state briefly the proofs of this change.

5. Is the land gaining on the sea? If so, give shortly the evidence of such advance.

6. Are there any artificial causes which tend to increase or retard the natural changes on the coast? For instance, are there any groynes along the shore, and if so, what effect have they on the travelling shingle or sand? Are the shingle, sand, or slabs of stone, removed for industrial or other purposes?

Signature of person Reporting.

Coast Guard Station.

FORM No. II.

OBSERVATIONS OF COAST CHANGES.

[*To be retained until there are some actual changes to be reported, after which the form should be filled up and returned without delay, in order that if needful a more careful survey of the changes reported on may be made by the Committee of the British Association.*]

Instructions to Observers in regard to Changes that may take place along the Coast-line of the British Isles.

A. When changes are actually observed to be taking place on the coast, either as to advance or retreat of the sea, it is very desirable that information

regarding them should be forwarded as soon as possible. For example, when any fall of a portion of shore-cliff occurs, note of the circumstances should be taken, with measurements (if that be found practicable) or estimates of the area or amount of material that has been dislodged. When any groynes or other artificial protections of the coast are washed away, this should also be reported, and likewise when any new groynes or other works on the coast are constructed.

B. The Council of the British Association will be glad to receive any other information of which the observer may be in possession, bearing upon the changes that are taking place along the shore.

[The answers to these two paragraphs A and B can be written below, or if necessary on other sheets of foolscap paper.]

_____ _____*Signature of person Reporting.*

_____*Coast Guard Station.*

At the first meeting of the Conference, the Rev. T. R. R. Stebbing, F.R.S., Chairman of the Conference, after a few preliminary remarks on the result of the discussion on Coast Erosion at the Bristol meeting, read a short paper on

THE LIVING SUBTERRANEAN FAUNA OF GREAT BRITAIN AND IRELAND.

In the first place he noticed the many animals which, though their dwellings are in some sense subterranean, yet come out and roam over the surface for various purposes either by night or by day. As examples he mentioned bats and rats, foxes, rabbits, badgers, moles, vipers, lizards, beetles, and worms, together with various marine species, which have a habit of burying themselves in sand and ooze. From these he turned to creatures which pass the whole of their lives underground in wells and caverns. The first undoubted mention of a subterranean animal of this kind seemed to be that of a crustacean belonging to the Amphipoda, found in London, and named by Dr. Leach, of the British Museum, in 1813. Since that time many valuable treatises on creatures of subterranean life had been published in various European languages, including the Polish. The English student should study "The Cave Fauna of North America," by Dr. Packard, published in the *Memoirs of the National Academy of Sciences*, Vol iv., Washington, 1888; also "The Subterranean Crustacea of New Zealand," by Dr. Charles Chilton, published in the *Transactions of the Linnean Society of London*, 1894. Packard enumerated 308 European cave animals, and 102 American. This total of 410 includes a few Protozoa, a Sponge, two Hydras, a few Worms, one Mollusc, several Crustacea and Myriapods, numerous Arachnids and many Coleoptera. The other insects were chiefly Thysanura. The Vertebrates consist of four American Fish and one European Batrachian, the celebrated *Proteus anguineus*. The known well-fauna of Great Britain and Ireland comprise only four species of

Amphipoda, and these De Rougemont would reduce to a single species.[1] Two other forms, however, have been found in recesses of coalpits in Scotland and Northern England. Mr. Stebbing noticed the blindness and want of colour characteristic of this subterranean fauna; also the singular fact that while its study may be said to have begun in England, almost every discovery therein during the last 50 years had been made in the wells and caverns of other countries, whether European or American. He concluded by remarking that it would indeed be extraordinary should Great Britain and Ireland not yield on investigation a fauna comparable to that found in other parts of the world. In this research he hoped that some members of our local scientific societies might take a share.

In answer to a question as to the best way of catching "Well-shrimps," Mr. Stebbing replied that a good plan was to wait till the well was nearly empty, then let down a bucket and withdraw it as soon as possible. Sometimes they were brought up when pumping was going on.

Some discussion then ensued, in which Rev. J. O. Bevan, Mr. T. Workman, and Mr. Hotblack took part, as to whether the Bats in the Mammoth Cave of Kentucky passed all their time there. It was hardly a matter that could be decisively settled, but some presumption that they did not was afforded by a remark of Mr. Workman's (who had visited the Mammoth Cave) that they were not found in the depths of the Cave, though in great numbers near the mouth.

Mr. Hotblack said that a Well-shrimp had been obtained at Norwich by a member of the Society he represented (Norfolk and Norwich Naturalists' Society).[2] Mr. Mark Stirrup mentioned that a few years ago a Society was started in Yorkshire for cavern exploration, with which a search for underground fauna might well be combined. Mr. Stebbing had certainly opened out for them a new field of research.

The Chairman (Mr. Stebbing) added that two gentlemen had written to him on this subject, Mr. E. S. Goodrich, of the Department of Comparative Anatomy, Oxford, who would be glad to have any specimens of blind Crustacea from wells and caves for experimental purposes, and Dr. Charles Chilton (to whose work on the underground fauna of New Zealand he had already referred) who was living in Edinburgh. Dr. Chilton was collecting information about the English Well-Amphipoda, and would be glad of specimens. A general hope was expressed

1 In a letter to the Editor, Mr. Stebbing says that the British Well-shrimps are *Niphargus aquilex*, Schiödte, *N. fontanus*, Spence Bate, *N. Kochinas*, S. Bate, and *Kraangonyx subterraneus*, S. B. He adds, "of these the first is most frequently met with in England."

2 This species is *Niphargus aquilex*, see "Notes" in the present part of the E.N.—Ed.

that Mr. Stebbing's paper would be printed in full, and the meeting came to an end.

It occurs to me here to remark that it is highly desirable that an account of the finding of a Well-shrimp, or other wholly subterranean creature, should give not only the depth of the well, but also the nature of the rocks through which it is sunk. Of course, in the case of a well sunk in sand or gravel, no subterranean animal could be expected, unless it were so minute that not only the ova but the adult animal could pass through the mass as the percolating water does. But it would be interesting to be able to note the proportion of subterranean creatures, if any, in sandstones as compared with limestones. In both kinds of rock water circulates mainly along lines of jointing or lines of fault, but in limestones the dissolution of the rock here and there, by the action of the water percolating through it, gives rise to hollows and caverns varying in size from spaces only large enough to accommodate a few Well-shrimps to the Mammoth Cave of Kentucky. In sandstones, on the other hand, hollows arising from the dissolution of the rock do not occur, but it seems possible that here and there in a sandstone, along lines of jointing or of fault, the erosive action of water carrying particles of sand in suspension might at length give rise to spaces capable, as regards size, of being the residence of Well-shrimps, though nothing comparable to limestone caverns would be produced. Therefore, while subterranean animals may naturally be expected to exist mainly, if not wholly, in limestones, it seems quite within the limits of possibility that certain forms of life, probably differing from those common in limestone, may some day be found in sandstone wells. Wells, however, in Essex, Suffolk and Norfolk are almost certain to be either in that well-known limestone, the Chalk, or in superficial sand and gravel.

At the SECOND MEETING of the Conference on September 19th, the proceedings began with a long and desultory debate as to the best ways of making the meetings of the Conference more useful. While it was proceeding Rev. T. R. R. Stebbing had to leave, and Professor W. W. Watts became Chairman. At length it was decided that it would be best for individual delegates to write to the Corresponding Societies' Committee, suggesting improvements, not later than the end of the first week in November. Letters received by that date would then be considered by the Committee, when they met later in that

month. Then Mr. Hugh Blakiston, Secretary of "The National Trust for Places of Historic Interest or Natural Beauty," gave a brief account of the aims and modes of action of that Institution.

The National Trust, said Mr. Blakiston, was founded in the year 1894 by the Duke of Westminster, the Earl of Carlisle, Lord Hobhouse, the Right Hon. James Bryce, Sir Robert Hunter, Miss Octavia Hill, and others, and incorporated as a limited liability company for purposes which are shortly set forth in the Memorandum of Association :—

"To promote the permanent preservation, for the benefit of the nation, "of lands and tenements (including buildings) of beauty or historic interest; "and as regards lands, to preserve (so far as practicable) their natural aspect, "features, and animal and plant life; and for this purpose to accept, from "private owners of property, gifts of places of interest or beauty, and to hold "the lands, houses, and other property thus acquired, in trust for the use and "enjoyment of the nation."

No lands or tenements of beauty or historic interest, given or bequeathed to or acquired by the Trust for the benefit of the Nation, shall, at any time, whether upon the winding up or dissolution of the Trust, or otherwise, be sold or otherwise dealt with in a manner inconsistent with the objects of the Trust; thus the Association affords ample security for the permanent safe custody of all property committed to its care.

Mr. Blakiston went on to remark that Great Britain is singularly rich in historic buildings, and is singularly indifferent to their preservation. In Austria, France, and Italy, it is considered one of the functions of a Minister of State to look after these national treasures. As regards the objects of the National Trust, the Queen's reign has been a peculiarly disastrous period on account of the growth of large cities, which has been necessarily unfavourable to the preservation of ancient buildings. Though a certain amount of destruction has been unavoidable, yet much might doubtless have been averted. Putting aside monuments of prehistoric times, there were still, buildings illustrating every stage of our history from the Roman Occupation to the present day. But the increase of population, and its tendency to congregate in large towns, are rapidly causing the more ancient central part of a town to become a wilderness of shops, offices, and eating-houses, the people frequenting these establishments by day sleeping in monotonous streets in the suburbs, where the children see around them nothing to suggest to the mind anything outside the dull round of every day life. It was most important that everything calculated to stimulate the imagination to realise our past history or to develop a feeling for natural beauty should be preserved, if possible. Then, millions of people living far from our shores look upon these Isles as their Old Home, and feel justly that our historical monuments and beautiful scenery should be preserved in a manner worthy of our great history. As examples of what the Trust has already done the following instances may be selected :—

It has, by purchase, obtained Barras Headland, opposite Tintagel Castle, and will preserve it unbuilt upon, with all its gorse and thrift and close cropped turf, to delight the dreamers of old Arthurian times, or the landscape painter of to-day.

Again, it holds, by gift, the most beautiful bit of cliff that overlooks Barmouth, its estuary and seashore, with the distinct understanding that no other walks than those at present in existence shall be made; that it shall be grazed, as heretofore, by sheep; and that no harm shall be done to the gorse that grows upon it.

The gift of land on Toys' Hill, near Oxted, Kent, has secured to the lover of English scenery one of those views of green foreground and distant background of blue hills, so characteristic of the country. Another and a larger property, at Ide Hill, in the same district, will soon be acquired.

It has, also, cast upon it the burden of raising funds to put into tenantable repair an early XIVth century clergyhouse, at Alfriston, in Sussex, and here, again, it has done all that loving care and wise direction could suggest to retain in its ancient condition the construction, the timbering, and the household arrangements, in order that men of the XIXth and XXth centuries may realise how men of the XIVth had their habitation.

It has lately, at the will of the Trustees, taken under its care the Falkland Monument, upon the Newbury Battle Field.

Nor have the claims of science escaped recognition. By the purchase of land in Wicken Fen, Cambridgeshire, a portion of the primeval fen land of East Anglia, with its plant and insect life, will remain undrained and unmolested for ever.

The National Trust is not only a holder of natural scenery and ancient buildings, but it also does what it can to promote local interest in the preservation of any worthy historical object or of natural beauty.

Whether it be a waterfall destroyed as in the case of Foyers, or an old bit of Sir Christopher Wren's London, the Trinity Almshouses, Whitechapel, that is threatened, or the quietude of Kynance Cove and the destruction of the rocks of the Cornish foreshore, near the Lizard, or the alteration of the line of the shore at Chelsea that is brought under its notice, or the need of obtaining such a pleasure ground as Churchyard Bottom Wood for the people, the Trust, working sometimes alone, at other times in conjunction with kindred societies, brings its influence to bear in the direction and spirit of its promoters.

It may be useful to add that a minimum subscription of 10s. includes membership and copies of the report, and entitles to a voice in the annual election of members of the Council and Officers of the Trust.

Mr. Blakiston concluded by remarking that it was proposed to form a Federation of Archæological and Naturalist Societies throughout the country, with the view of accomplishing what could not be achieved either by a Central Society acting by itself or by local Societies acting by themselves. The proposed scheme for federation would probably be issued by the National Trust during next month.

The work of the National Trust was generally approved by the delegates present. Mr. Gray gave some account of the unsuccessful attempt at Belfast to prevent a Syndicate from enclosing the Grant's Causeway, and Mr. Vaughan Cornish inquired to what extent the aims and objects of the National Trust were those of other Societies? Mr. Blakiston replied

that there was another Society for the protection of ancient buildings, but it had no power to hold buildings as the National Trust could. The National Trust was in close touch with that Society, also with the Selborne, the Commons Preservation, and other Societies. He did not think that there was any danger of overlapping as regards the work of these Societies. A vote of thanks to Mr. Blakiston was then heartily accorded, on the proposition of the Chairman.

Section A.

Mr. G. J. Symons said that the Committee for Seismological Observations was badly in want of a home, and would be glad if some ancient building could be allotted to them.

Section C.

The Chairman mentioned two investigations in which the local Societies had been of much assistance. The Committee to investigate the Erratic Blocks of the British Isles presented a report this year. The Committee for the Collection, Preservation and Systematic Registration of Photographs of Geological Interest, of which he was Secretary, would be glad to receive any contributions of such photographs. They hoped to be able to undertake the publication of typical geological photographs in such a way as to render them easily obtainable by those who could make good use of them. It would greatly help the Committee if local societies would agree to purchase a series of these photographs There was a duplicate collection of prints and lantern slides which could be sent to any local society wishing to exhibit them and to see what kind of work was being done, the only expense incurred by the local society being that of carriage. They proposed, when publishing the photographs to add letterpress descriptions.

It may be remembered that the duplicate series mentioned by Professor Watts were shown to the Essex Field Club last winter. Those who were present will remember their excellence

Section D.

The Rev. T. R. Stebbing said that the Secretary of that Section recommended the study of the fauna of wells and caverns by the Corresponding Societies

SECTION K.

Mr. H. Wager informed the delegates of the Corresponding Societies that the Section had appointed a Committee to consider the Geographical Distribution of Mosses, a subject of interest to all the Corresponding Societies.

Mr. Vaughan Cornish congratulated the Corresponding Societies on the result of the discussion on Coast Erosion, at Bristol, last year, initiated by Mr. Whitaker. Seldom, if ever, had the Admiralty acted so promptly before. The meeting then came to an end.

T. V. HOLMES, *Sec. Cor. Soc. Committee,*
Delegate, Essex Field Club.

NOTE ON THE OCCURRENCE OF THE WHITE-TAILED EAGLE (*HALIÆTUS ALBICILLA*) AND THE SALMON (*SALMO SALAR*) AT HARWICH IN 1666.

By MILLER CHRISTY, F.L.S.

WHILST examining recently some documents among the State Papers (Domestic Series) belonging to the reign of Charles II., preserved at the Public Record Office, I came by accident across one letter containing a very quaintly-expressed and curious item relating to the avi-fauna of the County of Essex. The letter was written from Harwich on the 20th of October 1666 by one Francis Newby, a servant of the Navy Commissioners at Harwich. It runs as follows[1]:—

HARW^{ch}, OCTOB^{r} 20th, 1666.

My deere friend,

J haue writt three seuerall Letters to you, of w^{ch} I haue had noe Answere of the Rec^{t} of any of them, w^{ch} makes me Doute of your non [?] helthe.

for Newes, I haue Not any, onely yesterday heere lighted vpon the Rope house one the Greene[2] a Mighty Greate Eagell. from whence she Cam is Not knowne. she was kild by one of the Carpenters belonging to his Mat^{s} yard heere. her wings are 7 foote od jnches long, one of her Clawse being vpwards of nine jnches long. 'tis jmagined y^{t} she Cam from beyond the Sease,

1 *State Papers, Domestic*, Charles II., vol. 175, no. 120.

2 "The Store-Houses to the Rope Walke" are shown on the Green in the general view of Harwich given in the beginning of Dale's *History and Antiquities of Harwich and Dovercourt* (London, 4°, 1730).

from sum far Cuntry, and was Extreame weary, hauing one shot made at her, and budged not; but, at the second shott she was killed.

Mr. Readman acquainted me y^t^ hee deliuer[ed] y^e^ small token J sent you, w^ch^ was a dryed Salmon; w^ch^ be pleased to accept as a poore mite of y^e^ affection of

Yo^r^ Reall Freind and humble Seru^t^,
FFRA. NEWBY.

[P.S.]—The shipps that are Now in harbour to be Refitted out w^th^ Speede are the Coulchester, Speedwell, Vicktory, Richmond, Garland, Reserue, Aduenture, and Delfe.

The matter did not end here. Joseph Williamson, Secretary to the Navy Commissioners, hearing, from the official to whom this letter was addressed, of the occurrence of the Eagle, wrote to Mr. Silas Taylor, Keeper of the King's Stores at Harwich,[3] and one of Newby's superiors, asking for further information about the bird. Taylor's reply[4] here follows:—

HARWICH, Oct. 25, 1666.

S^r^,

This morning the Truelove, from convoying the Amunition to Scilly &c., return'd backe hither, haueing first conuoy'd the Shipps imployed in that seruice safe backe. Her consort, the Roebuck, is gone for Ireland.

At the end of your last written Intelligence, I read the Story of our Eagle kil'd here. I saw the Skinne of it, but did not looke upon it as soe strange a thing as others did; for why should not an Eagle fly hither as well as to Scotland? Others thinke that the Eagle may come Southerly, as beeing weather-wise and [that its coming] prognosticates a hard winter; and severall thoughts severall men haue. I haue nothing to say to it: Onely an Eagle was kild here; and I sent you noe notice of it because I though it not worth y^e^ writeing about; and, your intelligence giveing me notice of it, I thought it may bee a freindly reproofe.

Our Shippe are here still [that] I formerly wrote you off; and we haue noe newes; Onely I am, S^r^,

Your most humble serv^t^,
SILAS TAYLOR.

To Joseph Williamson, Esquire.

3 This Silas Taylor (*alias* Domville) was the man who collected the matter relating to the history of Harwich which Dale afterwards added to and published in 1730. Dale speaks of him in his preface as "a lover of Antiquities, a person of leisure, and a member of the Corporation," but adds that, "dying in debt, all his MSS. and papers were, together with his goods, seized on by his creditors and so dispersed."

4 *State Papers, Domestic*, Chas. II., vol. 176, no. 28.

In all probability, the bird in question was a White-tailed Eagle, specimens of which (generally immature) are not uncommon, even now, in Essex in the winter time[5]; while it is quite likely that the Salmon mentioned by Newby was caught in the River Stour, though, as it was dried, it may have come from elsewhere. It will be seen on reference to Dr. Laver's *Mammals, Reptiles, and Fishes of Essex* (p. 103) that the Salmon was formerly a regular inhabitant of our principal Essex rivers and is, even now, more or less polluted as most of them are, a not infrequent visitor.

YARDLEY HILL, THE LATEST ADDITION TO EPPING FOREST.

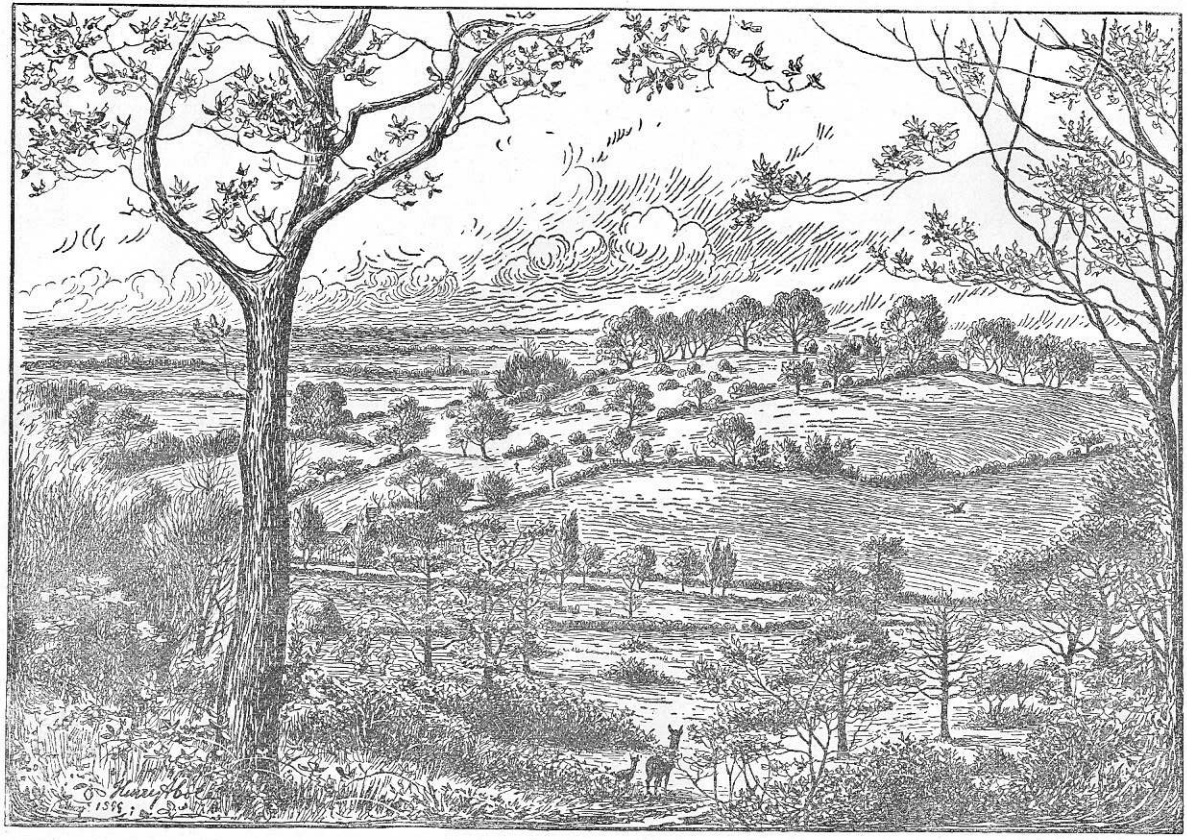
SINCE that memorable May morning seventeen years ago, when Her Majesty the Queen granted the modern "Carta de Foresta" by personally dedicating 5,500 odd acres to the use and enjoyment of the public for ever, friends of the "free forest" have recognised with gratitude and pleasure three notable additions to the woodlands. These are "Oak Hill," Theydon, "Highams Park," Walthamstow and Woodford, and the latest gift, "Yardley Hill," Chingford.

It is to the generosity of Mr. E. N. Buxton, to whom the public are indebted in large measure for the previous acquisitions, that this last splendid addition to the forest is due. At a meeting of the Common Council of the Corporation of London, on Thursday, October 20th, the following letter addressed to the Lord Mayor was read:—

"Knighton, Buckhurst Hill, October 18th, 1898.

"My dear Lord Mayor,—I have for a long time past been impressed with the importance, if not the necessity, of securing the picturesque vantage ground known as Yardley Hill as an addition to Epping Forest. It is a timbered ridge which projects into the Lea Valley basin, from which river its highest point is distant about 400 yards. From its prominent position it commands many miles of the valley, along which a manufacturing population is steadily assembling, as well as such distant points as Hampstead, Barnet, and the high grounds near Broxbourne. A more practical consideration is that it would connect that charming outlying portion of the Forest called Gillwell-lane, at present, owing to its isolation, rarely visited, with the main block near Hawkwood. My efforts, more than once renewed, have at length been successful, and I have now the pleasure of begging your Lordship, as

5 There are two specimens in the Museum of the Essex Field Club.



YARDLEY HILL, EPPING FOREST, as seen from Bury Wood. Drawn by H. A. COLE, May, 1899.

chief of the Conservators of Epping Forest, to accept 28 acres of this land for the public use. In making this offer, may I once more express to the Corporation, over which you preside, my abiding gratitude for their spirited action in the past, and my confident hope that, in conjunction with the residents, upon whom a duty also lies, they will lose no reasonable opportunity in the future to consolidate, extend, and complete the precious inheritance of which they are the trustees.—I am, my Lord Mayor, your obedient servant,

"E. N. BUXTON."

Mr. Deputy Snowden, in moving that Mr. Buxton's handsome gift should be accepted, said the offer was a most gratifying one, and it was not the first, the second, or the third time that Mr. Edward North Buxton and his family had conferred benefits upon the Corporation. (Hear, hear.) It showed also that Mr. Buxton, who knew more about the Forest than anyone else, was thoroughly satisfied with its management. (Applause.) He moved, "That this Court gratefully accepts the munificent offer of Mr. Edward North Buxton, one of the Verderers of Epping Forest, to present 28 acres of land forming a portion of the Yardley Hill Estate, Sewardstone, as an addition to the Forest, and accords him its sincere thanks for his much-valued gift, which the Court regards as a further substantial proof of the deep interest taken by him in the welfare of the Forest, and of his ever-increasing desire to add to its beauties and make them more accessible to the public whom he faithfully serves."

Alderman Sir Reginald Hanson, in seconding the motion, said the gift was all the more gratifying as Mr. Buxton had not always seen eye to eye with the Corporation in regard to matters connected with the management of the Forest. (Hear, hear.)

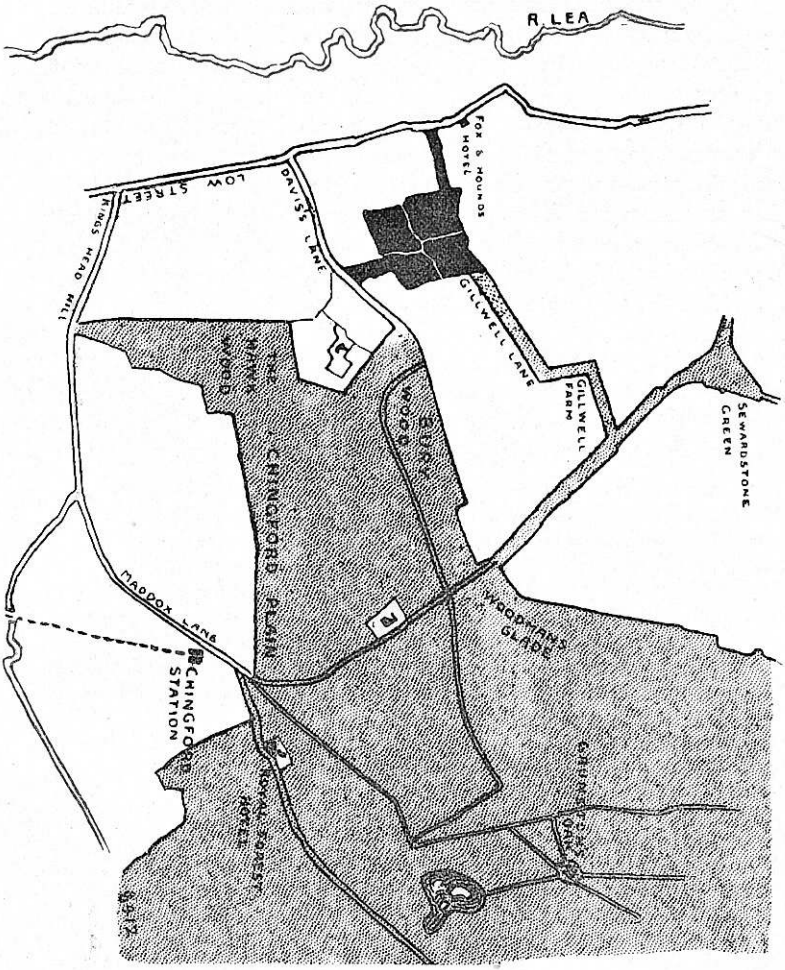
Mr. Judd remarked that it was a most unusual circumstance that a gift like the present was made to any public body accompanied by expressions which dignified it and rendered it more valuable. (Hear, hear.) The Corporation was well aware of the valuable services which Mr. Buxton and his family had rendered to the people of Greater London on the School Board and elsewhere. Mr. Buxton, instead of occupying his time for his own benefit, had chosen to devote it to the public service, and had generously spent much time, labour, and money on their behalf. (Applause.) Mr. Judd said he did not think he was out of place in calling attention to the expressions which had accompanied the gift. (Hear, hear.)

The motion was then adopted, amid loud applause.

Mr. Deputy Snowden then moved that the letter should be referred to the Epping Forest Committee, in order that the necessary steps might be taken in respect to Mr. Buxton's gift.

The motion was adopted, and it was further resolved that Mr. Buxton's letter should be printed on the minutes, and entered on the journal of the Court.

In accordance with the instructions thus given, the Epping Forest Committee, in their report presented on the 9th February, 1899, were enabled to say that possession of the land had been handed over, the hedges dividing the various fields had been



Plan showing the position of the four fields at Yardley Hill, recently added to the Forest. These are printed dead black on the plan.

demolished and obliterated, and a fence has also been erected between the land of an adjoining owner and the narrow strip which is to form the new approach to the Forest from Low Street on the Sewardstone road.

On Thursday, June 1st, 1899, a large company assembled on the crown of Yardley Hill to witness the dedication of the spot, "to be part and parcel of Epping Forest and to be open for ever to the public," the ceremony being performed by His Royal Highness the Duke of Connaught, Ranger of the Forest, who was accompanied by the Duchess. The day was summerlike and pleasant, and the fine broad landscape of the valley of the Lea seen from the hill enabled the visitors to realise vividly that a most important accession to the waste of the Forest had that afternoon become a matter of history, and warm expressions of gratitude to Mr. Buxton for his thoughtful kindness were heard on every side.

A small addition to the Forest has also been made at Leytonstone. This fact is thus alluded to in the Report of the Epping Forest Committee:—

"Harrow Green, Leytonstone, was coloured green on the deposited and final maps of Epping Forest as being part of the open waste of the Forest. A small brick-built and timber shed was erected by the turnpike road trustees on one portion of the green somewhere about the year 1847, and the arbitrator appointed by the Epping Forest Act, 1878, had no jurisdiction to deal with it. This shed and its site, which was let at £4 per annum, was recently offered for sale by public auction. The Leyton Urban District, being desirous that we should hand over the care and management to them to lay out and plant the same, suggested that the Conservators should purchase the shed and its site, and they offered to contribute one-half of the purchase-money. Having regard to the desirability of acquiring and removing the shed, which was an eyesore, if not an actual nuisance, we made arrangements through Mr. Solicitor for its acquisition. The sale took place on 27th October last, when the property realised the sum of £130. A conveyance has been made to the Conservators, and the District Council have contributed the sum of £65 towards the purchase-money. Notice has been given to the tenant to quit the property on the 25th of March next, when the shed will be removed and its site thrown into the Forest."

It may be interesting to note the quantity of land in the Official Forest. The original award of Lord Hobhouse, made on July 4th, 1882, estimated the area as 5,530 acres, 3 roods, 17 perches; Oak Hill is 12 acres 2 roods; Higham Park, 30 acres 2 roods 39 perches; Yardley Hill, 28 acres. From this total must be substracted the four acres taken compulsorily in

1885 by the Woodford Local Board (*Jour. Proc. E.F.C.* iv., pp. cxxxvi—vii.); so that not counting such small additions as the plot at Harrow Green and elsewhere, 5,598a. 0r. 16p. represents the present area of the "free and open" grounds of Epping Forest.[1]

[We are indebted to the *City Press* for the report of the meeting of the Common Council, and also to the courtesy of the editor for the loan of the block of the plan printed above. The view of Yardley Hill was contributed by Mr. H. A. Cole to the *Daily Graphic*, but the present block is a new one made from the original drawing, which was purchased from the *Daily Graphic* by our member, Mr. Avery, and is now reproduced by his favour.—Ed.]

THE AFTER-EFFECTS OF THE HIGH-TIDE OF NOVEMBER 29th, 1897.

"REPORT ON THE INJURY TO AGRICULTURAL LAND ON THE COAST OF ESSEX BY THE INUNDATION OF SEA WATER ON NOVEMBER 29th, 1897." BY T. S. DYMOND, F.I.C., F.C.S., and F. HUGHES, F.C.S. SEPTEMBER, 1898.

IN the account of the High Tide given in the Essex Naturalist (vol. x., pp. 277--283), we alluded to the interesting observations made by our members, Mr. T. S. Dymond and Mr. F. Hughes, on the effect of the floods on the fertility of the land (l. c., pp. 282--3) These gentlemen continued the investigation in the Technical Laboratory at Chelmsford, and they have recently published a more complete and extended report on the subject.

It is unnecessary to repeat the details of the calamity already given in our pages. The authors approximately estimate the areas of agricultural land flooded in Essex as follows:

Tendring Hundred	5,570 acres.
Winstree Hundred	3,350 ,,
Thurstable Hundred	1,420 ,,
Dengie Hundred..	5,260 ,,
Rochford Hundred	10,620 ,,
Barstable Hundred	2,370 ,,
Chafford Hundred	950 ,,
Total..	29,540 ,,

The authors remark that in some districts the water drained off the land in a few hours, in others several days passed before

1 For estimate of the ancient area of Epping Forest, compared with the present, see W. Cole, *Journal of Proc. E.F.C.*, vol iv. p. ciii.

it was got rid of, while, where the sea walls were very seriously damaged, several weeks, and even months, elapsed before this could be done. So difficult did it prove to repair the breaches in the sea walls in New England and Pewit Island, and in part of the parish of Fambridge, that the attempt was abandoned, and many hundreds of acres of land have now reverted to the condition of "saltings."[1] The injurious effect of salt water on crops is variously stated by different authorities to last from five to twenty years. This inquiry was undertaken by the authors with a view to advising as to the best means of cultivating the land, and also to determine the amount of salt deposited, the time required for its removal by drainage, and its chemical and physical effects upon the soil constituents; knowledge which must be of value in the event of future inundations, an event not unlikely to happen while the sea-walls on many parts of our coast remain in their present insecure condition.

To ascertain how far the presence of Common Salt was injurious to the crops, a determination was made in samples of soil taken in January, 1898, from different localities and at different depths. Tables are given showing the per-centages. The average of the top soil was ·25 per cent., or about 25 times more than the average amount in the soil from unflooded land,[2] and equal to about $2\frac{1}{2}$ tons per acre. In all probability, a quantity of this weight applied as a top dressing would injure most crops, but the writers state that there is evidence of a much larger per-centage of salt being present without directly affecting plant growth: but in this case it is diffused through the soil, and consequently does not concentrate its action upon the roots or stems of the plants. Wheat and turnips—the former newly sown and not yet germinated at the time of the flooding—grew on land containing ·3 per cent. of salt; while mustard, turnips, mangolds, beet, cabbage, peas, creeping-bent grass, and red fescue, sown in flower pots filled with soil from two of the flooded districts, all germinated well and were apparently absolutely uninjured, even at the most critical period of growth, by the salt left in the soil. It would thus appear that, although the

1 For details the reader is referred, not only to the original Report, but also to Mr. Percy Clark's papers on "The Encroaching Sea on the East Coast" (E. N., vol x., pp. 297–299), and "Some Further Notes on the Effects of the Great Tide of November, 1897;" also to the note, "Disastrous Effects of the High Tide of November, 1897, at North Fambridge" (pp. 375-6), and the extracts, "Truly Derelict: a Curious Corner of Essex," printed on pp. 397–399, in the same volume.

2 The authors estimate the water of the North Sea to contain 2·7 per cent. of common salt, and about ·5 per cent. of other chlorides and sulphates. The common salt would be sufficient in quantity to produce serious injury to plants by plasmolysis of the root-hairs.

salt water was harmful to submerged crops, the salt left after the flood receded, and, especially when incorporated with the soil, was not directly injurious to subsequent crops.

The *indirect* action of the salt water was, however, very marked. The earth worms were killed off, and were seen after the inundation strewn upon the ground, and were quickly consumed by the gulls. It is only now, after nearly two years, that young worms are beginning to re-appear.

But the injury, say the authors, was more far-reaching than this. For some time after the flood, the soil was in a remarkably good condition, the reason for this being that the immediate effect of salt is to granulate gelatinous clay, in the same way that salts of lime are known to do. The condition of the soil, however, gradually altered until it became difficult to work, in dry weather hard and "cindery," and in wet the water percolated through the soil to the drains only half as rapidly as was the case on the unflooded land. In order to ascertain the chemical changes that occurred to render the flooded soil more gelatinous, samples of the flooded and unflooded soils were analysed, when it was discovered that the amount of lime, magnesia, potash, and soda was less by one-fifth in the clay from the former than in that from the latter. These effects appear to be due to the chemical action of the chlorides of the sea water upon the double silicates of the soil, which are decomposed, the silicate of alumina being left behind in a gelatinous condition. The writers conclude that one effect of the salt has been to eliminate the lime and other bases from the clay, and hence the unworkable and infertile condition of the soil.

The means by which the excess of salt might be removed formed an interesting point for investigation. In course of time it would certainly be eliminated by cropping, but evidence shows that this process is too slow and expensive to be solely depended on. Other methods must be employed, and the effectual and practicable ones appear to be thorough cultivation and drainage, By keeping the drains in proper working condition, the salt. being very soluble in water, is readily carried away by rainfall. As showing the effects of rain in a thoroughly drained soil in removing salt, the writers mention that, in an experiment made in the laboratory, it was found that $1\frac{3}{4}$ in. of rain water, when allowed to filter through 6in. of the soil from the flooded arable land at Wallasea, was more than sufficient to remove almost every trace of salt. Of course, as is pointed out, the elimination

of salt in the field is a very different matter, since during dry weather the evaporation of water from the surface causes an upward movement of salt. Consequently, a much heavier rainfall than 1¾in. would be required to effect the desired result. But there is no better method than thorough drainage and trusting to the rainfall, and results indicate that in about two years' time the salt may be reduced to harmless proportions, if proper advantage is taken of the natural remedy. For the eighteen months from December, 1897, to May, 1899, the total rainfall was 26¾in., and a second analysis of the soil showed that during this period the salt had been reduced in some cases to one-tenth, and on the average to one-quarter of the amount present in the beginning of 1898.

After showing the impoverishing effect which the salt has had upon the soil, attention is directed to the consideration of the crops best adapted for flooded land. Wheat, barley, oats, and mangolds have all given a fair yield in some cases, and in others have completely failed. Ryegrass, of which much was expected, has proved disappointing, in some cases even failing to germinate. The only class of crop or weed that was uniformly productive was the Cruciferous order, kale, rape, mustard, turnips, and the hated charlock, all prospering where other crops failed.

Very interesting details are given throughout the paper, derived from chemical and cultural experiments, and in their extended form, Messrs. Dymond and Hughes' researches are of considerable importance from a scientific as well as an agricultural point of view.

ON THE LOCAL EXTINCTION AND DIFFUSION OF MOLLUSCS IN ESSEX.

By J. FRENCH.

[*Read December 12th, 1896.*]

THE object of these remarks is to show that local observation in our districts may be rewarded by obtaining cases of diminution and increase of species of Mollusca in quite recent times, and to show how small are the factors that effect these changes.[1]

1 [Mr. French began his paper by some general observations of a more or less theoretical character, on the geological history of the Mollusca, and the agencies which may have caused their variation and distribution. These observations are omitted as being hardly suitable for our pages. The Editor has to thank Mr. T. V. Holmes, F.G.S., and Mr. W. Whitaker, F.R.S., for very kind advice and assistance in preparing the paper for the press A few notes by Mr. Holmes are indicated by the initials T. V. H.—Ed.]

On looking over the list of the Land-Mollusca of the British Isles, we observe how large is the proportion of small, and even minute, forms. Yet other things being equal, in power of distribution by travel the larger Molluscs have a great advantage. I once kept a specimen of *Helix pomatia*, which was a habitual traveller, and once crept nearly a hundred yards in one night. Hence, the large species would have a better chance of obtaining new settlements than small ones. It is probable that the larger forms, in some cases, suffer, or have suffered, destruction chiefly on account of their conspicuousness. It is a common experience of the snail-hunter that at the outset he cannot find the minute forms, nor, if he had to depend upon his eyes and hands alone, could he make much progress, except accidentally. Yet in time he gets to learn that, in point of numbers, many of these minute species may far outnumber the larger forms with which everyone is familiar. The inference here is plain—that, given any snail-eating bird or other animal, the larger forms are those that will first succumb, whilst the smaller species will escape notice. Part of the disparity in numbers between large and small species may be due directly to their size. There are a few species that are quoted chiefly from sea-board districts that may be noticed. That they are not dependent upon a littoral vegetation or conditions is clear from the circumstance that they are sometimes found inland. Such are *Succinea oblonga*, *Helix revelata*, *H. pisana*, *H. virgata*,[2] and others. The reason seems to be that they meet with enemies as the country is penetrated, and rarely succeed in permanently spreading themselves inland.

It is, however, possible that the enemies of snails in England now do not very greatly affect their distribution. *Helix nemoralis* is everywhere common, and yet it is everywhere sought for by blackbirds and thrushes. In the immediate past, as instanced by the shell-marls, it was equally common, and it has therefore held its own in spite of its enemies, other causes probably operating to favour its vigorous life and wide distribution as a species. One effective cause of extinction of Molluscs is change in the character of the habitat. The variations in my neighbourhood (Felstead) are due to two causes. One is the wasting away of a calcareous soil, and the other is the increasing dryness of the soil due to drainage. We will take the cases due to calcareous waste first. One is so patent as to have attracted

2 [But *Helix virgata* is one of the species which Mr. French has observed immigrating into Felstead. See his remarks below on the introduction of species.—Ed.]

the attention of Essex naturalists for many years; I allude to the almost complete extinction of *Cyclostoma elegans*, compared with its great abundance in Roman and comparatively-recent times. This shell was thought to be now quite extinct in Essex, but in the year 1890 I found a small colony of them alive in Felstead, and they are still in existence (see ESSEX NATURALIST, vol. IV., p. 92). *Cyclostoma* is always, I believe, described as associated with chalk or limestone. In Essex this chalk was supplied by the Boulder Clay, or by the tufa which is formed by the re-deposit of chalk at places where springs issue. But the Boulder Clay is a wasting product, and is only occasionally found on the valley slopes, neither is it continuous over very large spaces on the higher ground,[3] and where it is, drainage and other artificial agencies have deprived the snail of its shelter and broken up its colonies (always an important step towards local extinction), so that *Cyclostoma elegans* has now almost completely disappeared.

Another shell that is generally described as affecting a limestone habitat is *Helix lapicida*. This species is, I feel sure, verging also on total extinction, although still living in some parts of Essex. There are no data, so far as I am aware, to prove that it ever approached *Cyclostoma* in numbers, but there is sufficient evidence to show that its wide-spread distribution was due to conditions other than those now in operation. The stage of separation and isolation is now very far advanced, and *Helix lapicida* is always quoted as being local and in very small numbers. Where such a condition of distribution obtains over a very wide area, it is pretty clear that the species was once common in that area. I suggest that the wasting away of calcareous matter from the surface soil is a probable cause for the disappearance of this species.[4] Perhaps the greatest factor of all here at work in bringing about local extinction is the drainage of the land; this affects the Molluscs indirectly in many ways. In former times, when even the uplands were sometimes sour morass, growing mosses in abundance, and the county was well wooded, a certain amount of moisture was stored up in the daytime, to be given out as aqueous vapour and received back as

3 In reply to objections by Mr. T. V. Holmes and Mr. Whitaker, that "the Boulder Clay is continuous over the greater part of N. Essex and forms the surface of most of the high ground," Mr. French remarked that in "my neighbourhood (Felstead) Boulder Clay is certainly not continuous. A reference to the geological map is misleading, because the map only takes into account the *subsoil*. Wherever tillage is in progress, the surface soil, which is that in which Molluscs work, is deprived of its calcareous ingredient."—ED.

4 The greatly-increased preservation of birds may account for the disappearance of some species of snails.—T. V. H.

dew at night. This allowed the Molluscs an excursion daily, and, in the long run, further peregrinations and a wider field for the distribution of species. In the arable and drained tracts of the present day, drought is much more prevalent, and dewy nights are possibly not so frequent; as a consequence, the snail is much limited in its range and opportunities. In short, where once the whole summer was humid, there are now only the heavy dews of the spring and autumn. We cannot tell whether the food is correspondingly diminished. There is a little evidence in that some species frequent gardens where young juicy vegetation is more predominant, but it is equally true that many species do not go into a garden at all.

A drained tract acts directly in breaking up colonies and isolating individuals. All travel instinctively away from the drained tract, and consequently, many travel in opposite directions, never to unite again. This sub-division goes on more and more as the colonies diminish, till eventually they die out, from want of opportunities to pair. There are two cases which are obviously due to the effect of drainage, in which two species of Mollusca, formerly very abundant in Essex, are now fast hastening to local extinction. One is *Helix arbustorum*, and the other is *Zonites purus*. Both require to live in very moist situations. I have been fortunate enough to hunt up three small colonies of *H. arbustorum*, and in one case I had seen the colony die out to its last member. *Zonites purus* is now only found as single specimens in my neighbourhood, and these are few and far between.

The shell-marls and peat-bogs of this district, although not extensive, are very instructive with regard to the proportions in which the various species are represented. Some of these marls enclose Roman and other remains, and we can therefore learn approximately their age. I here copy a table which I made out for this journal in 1889,[5] in which I have made a slight alteration in the cases of *H. arbustorum* and *Cyclostoma elegans*, required by the subsequent observations alluded to above. I believe that in other respects it is correct. It will be seen by this table that local extinction may be a somewhat rapid process at times :—

5 "On the Mollusca of the Shell-Marl occurring at Felstead and in other parts of Essex." —ESSEX NATURALIST, vol. iii., p. 14.

SPECIES.	PAST DISTRIBUTION.[6]	PRESENT DISTRIBUTION.
Helix lamellata	Frequent ...	Locally extinct.
Pupa ringens	do. ...	do.
Helix carthusiana ...	Occurs ...	do.
Clausilia rolphii	do. ...	do.
Vertigo substriata ...	Frequent ...	do.
Zonites fulvus	Occurs ...	do.
Cyclostoma elegans ...	Common ...	Only a small colony existing.
Helix arbustorum ..	do.	Very rare; probably becoming locally extinct.
H. aculeata	Occurs ...	do. do.
Acme lineata	Frequent	do. do.
Vertigo antivertigo ...	Occurs ...	do. do.
Cochlicopa tridens ...	Frequent ...	Rare
Zonites purus	Common ...	Rare

Turning our attention to the Freshwater Mulluscs, other agencies affecting extinction may be assumed to come into play. Reduction of quantity of suitable food may be one factor, but of this I have no good evidence to offer. As regards lowering of temperature, something may be said. One species, at least, found readily in the ancient river alluvium, is now rare or locally extinct, although it still flourishes as the water becomes deeper towards the estuary. This is *Neritina fluviatilis*. The conditions under which the alluvium was laid down were those of stiller and deeper, and therefore, perhaps, warmer water; *i. e.*, not so readily affected by cold springs, which now appear to act as a deterrent of both animal and vegetable life, and of which I could instance many examples.[7] Other species have been known for many years in the lower reaches of the river, but they have been unable to make any progress up stream. Two or three species deserve particular attention among those that are dying out. These delight in ascending ditches that have an immediate communication with the river. Such are *Succinea putris* and *S. elegans*, *Limnæa palustris*, *L. truncatula*, *Planorbis carinatus*, *P. contorta*, &c. The *Planorbis* will flourish, even though their river-communication be cut off, but my experience is that

6 In the shell-marls and peat which, as shown in the paper on the Felstead Shell-Marl above referred to, were accumulating down to Roman times. They in this district all overlie gravels.—J. F.

7 [We have no evidence of any reduction of temperature in recent times; but drainage and the development of agriculture would certainly affect plant life and the increase or decrease of particular species.—T. V. H. As to evidence of reduction of temperature, Mr. Christy's remarks, in his recent paper on "Essex as a Wine-producing County" (*ante* pp. 44–46) may be usefully borne in mind.—Ed.]

Limnæa and *Succinea* are then at a decided disadvantage. I have carefully noted the case of both species of *Limnæa* above mentioned. *Limnæa truncatula* is always ready to take an excursion on wet grass, but *L. palustris* will not go beyond the wet mud on which it delights to repose; and what is more, it does not here live with other than a river-communication. Both may be described as marsh species, and the drying up of marsh land affects them equally. A small colony of *L. palustris*, var. *corvus*, is here (at Felstead) reduced to probably less than a dozen members. I saw one of these pairing with an individual of the normal type—a sure sign of its diminished numbers. The pond fauna also, from the circumstance of increasing limitation, is gradually giving in.[8] *Limnæa stagnalis* of the normal type is now very uncommon; the variety *fragilis* is much more plentiful; both have forsaken the river. *Planorbis carinatus* appears to have nearly forsaken the river also, although it is common in such ponds as we have here.

These instances will show that our Freshwater Molluscs undergo the same mutations of distribution as their land kinsmen. Taking mine as a fair locality, we find that local extinction is in constant progress.

We have now to turn to the other side of the question, and see what we have in the way of introduction to counterbalance the loss of species becoming extinct. It is obvious that where whole families are unable to exist on account of unfavourable conditions, there is but little hope of new arrivals establishing themselves, assuming these to require pretty much the same conditions as the old members. Nevertheless, we are not quite without examples of the immigration of species not native of the locality.

The introduction of a species is not a matter of common observation, but I have had the good fortune to witness what I believe to be a great local increase of one species—*Helix virgata*. It came in from the north, apparently, and the great army is still to be found a few miles in the rear of the outposts: but it is most certainly moving southwards, and, I doubt not, will pass over this part of Essex like a slow-moving wave. Then, again, among the aquatic species I have, I think, been able to trace a

8 ["Drainage has, no doubt, been carried out very largely during the past three or four years. On the other hand, the disuse of the Chalky Boulder Clay as manure has caused the marl pits to become ponds, which are extremely numerous in a C. B. Clay district—as may be seen N. of Chelmsford."—T. V. H. On this Mr. French remarks, "Our marl-pits at Felstead, as a rule, do not contain water, they having been dug through to the gravels."]

slight advance in my direction of the two species of *Paludina* (*vivipara*). They are now divided from my neighbourhood by an insignificant watershed.

A history of the "old," but geologically recent, marls does not give much evidence in favour of new arrivals since that period; almost all our present species are found in these deposits. I cannot, however, trace the species I have named as new arrivals in any of the Essex lists of the marl fossils, nor have I found them myself; and as they are conspicuous forms, we may safely conclude that they did not live in the neighbourhood at the time these marls were deposited. I am credibly informed that *Helix aspersa* does not occur in the older marls, and among the smaller species there may be some other instances.

We have a few species now that occur in extraordinary abundance—several of the *Helices* and *Zonites*, some species of *Pupa*, and among the Freshwater forms some species of *Planorbis*. *Bythinia*, &c.

In considering the variations and wanderings of Molluscs, many factors enter into the problem, the values of which are not themselves well understood. Thus we say, and on good evidence, that a species will remain unvaried and without appreciable change of distribution for an enormous length of time, Some, possibly, go further in saying that the gregarious habits of Molluscs tend to this fixity in that it gives facility for perpetual intercrossing, and so keeps them bound to an average type. But, on the other hand, we are acquainted with numerous variations which may also, to a certain extent, be due to these gregarious habits. We cannot tell how these variations are set up—whether it is due to the preservation of some variation in a diminishing colony, or whether it is due to the change of food and environment in a full colony. Again, as to their wanderings. Like plants, they are sometimes found having a time of introduction, culmination, and decay. Some spread themselves over a whole tract of country; others confine themselves strictly to a circumscribed locality. We conjecture that the supply of food is directly concerned in these wanderings, and the more one notices the habits of Molluscs, the more one becomes impressed with the idea that snails are very fastidious creatures; it is certain that they will in some cases prefer starvation, or rather hibernation, amounting to death, rather than make any material change in their diet or be greatly disturbed in their habitat. If

therefore, the food, &c., does affect the distribution and the distribution does not affect the perpetuation or loss of a variety, we have here an important factor, of which probably but very little is known.

NOTE.—Since writing the above I have obtained additional evidence as to the local distribution of *Helix virgata*. I have found it in great numbers at another point about three miles west of Felstead. As, however, there is not a scrap of evidence that I am aware of to show that it has ever lived at Felstead, I must still regard it as an incoming species.

Many other species occur in patches, as it were, at distant intervals, but they are always, so far as I know, joined by here and there an individual. This is certainly not the case with *Helix virgata*, and on such grounds, and in the entire absence of fossils, I must hold it to be a new comer.—J. F.

[Mr. French ended by giving some observations on suggested causes of variation in the Mollusca. But speculations on this most difficult subject, in the absence of long-continued experimental observation, are of little or no value. We must await the establishment of the inland Experimental Biological Station, which, it is to be hoped, will one day be founded.—ED.]

A SUPPOSED NEOLITHIC SETTLEMENT AT SKITTS HILL, BRAINTREE, ESSEX.

By the Rev. J. W. KENWORTHY, Vicar of Braintree.

With Remarks on the Archæological Objects, by F. W. Reader; on the Geology of the District, by T. V. Holmes, F.G.S., F. Anthrop. Inst.; and on the Osteological Specimens by E. T. Newton, F.R.S.[1]

[*Read February 25th, 1899.*]

The District, and Preliminary Remarks.

On the south side of Braintree there is a small stream, or rivulet, mentioned in recent books and spoken of in common parlance by various names—the Pod; Pods Brook; the Bran; the Brain, &c. In Muilman's *History* it is called the "Stour." We read, "The river Stour waters this parish, over which there are three bridges—one on the road to Witham; another on the road to Chelmsford; and a third on that to Dunmow." It is below the first of these bridges that in very early times—in fact, soon after the cutting down of the valley to its lowest depths—that a Lake or "Broad" began to be formed by the silting up of the stream along nearly the whole of the present plain between the narrow hills which here form a gorge half-a-mile or so in length.

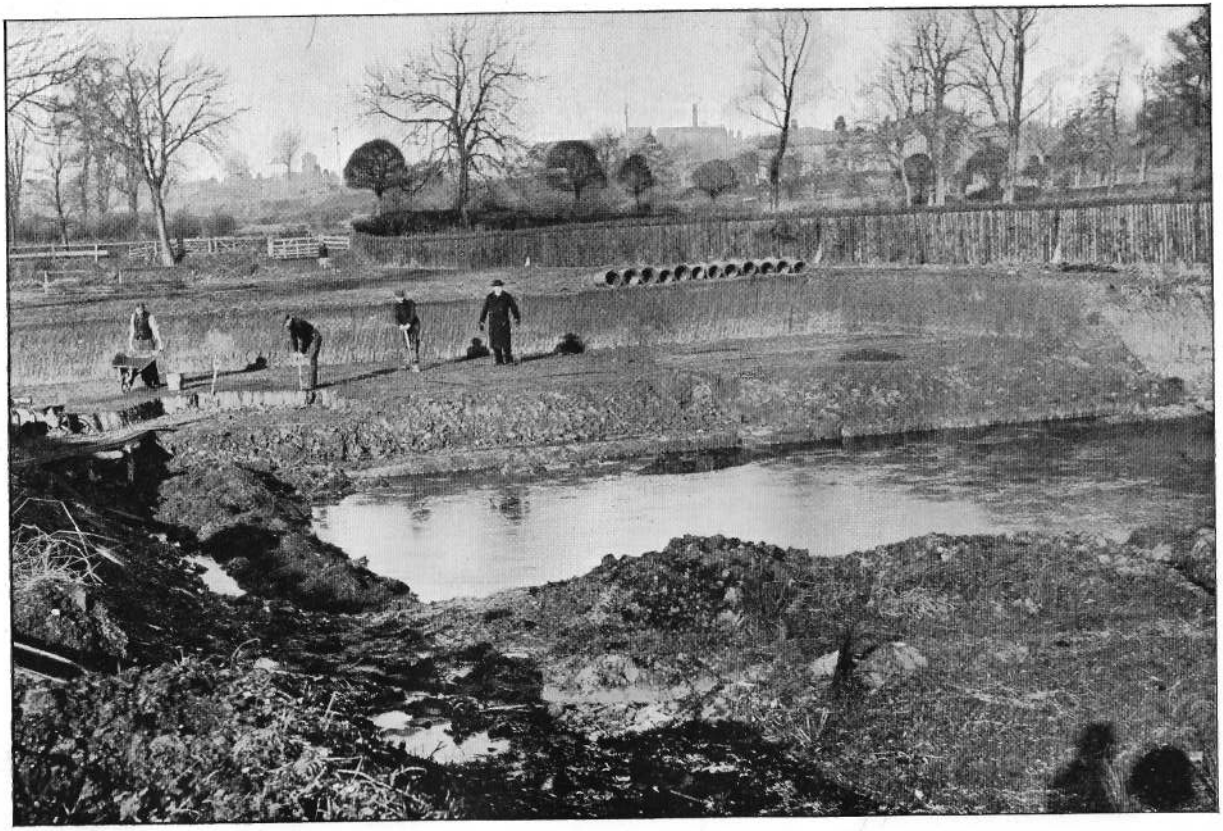
View of the Skitts Hill Site of the Lake Dwellings (*Plate I.*)

The view is taken looking N.W., and shows the extreme end of the excavations for brickearth; beyond the palings the present river runs. The building on the highest ground to the right is 219 feet above Ordnance Datum. The water shown in the photograph stands at 6ft. 6in. from the surface soil. Below the level of this water, from 6ft. 6in. to 9ft. is the bed of slime, mud, peat and wood containing the relics of the lake-dwellers. In the level where the men are working are found Roman tiles, and above this level horse-shoes and modern pottery. In front of the photograph the heaps are of wood-ashes and refuse of long-continued fires for domestic purposes, thrown out of the pit where the water now stands.

The excavation is on the right slope of the foot of the valley; to this slope the wheel-barrow is directed.

These excavations were begun about 30 years ago, at about a thousand yards lower down the stream. J.W.K.

1 [The Author and Editor have to acknowledge with gratitude the great assistance of the above-named gentlemen in the revision of this paper and in preparing it for the press. Mr. Reader has not only visited the locality several times, but has consulted with Mr. Kenworthy and the expert authorities at the Geological and British Museums, and has also prepared all the illustrations. Mr. Holmes has written and advised on the geological questions arising, and has visited the spot on two occasions. Mr. E. T. Newton, F.R.S., has in the kindest way examined all the osteological specimens. The appended initials of the above-named gentlemen indicate any notes added by them to the text. In addition to the above Mr. C. H. Read, F.S.A., and Mr. F. W. Rudler, F.G.S., have most courteously advised on special points.– Ed.]



View of the site of the supposed Lake Dwellings at Skitts Hill. Explanation in text.

This is only one of the numerous patches of low ground in Essex which were, in all probability, inhabited by man during the stone-age. And this early race of settlers, judging from the remains of their domestic animals and their manufactured implements and other relics, were probably in the same state of civilization with the Lake-dwellers of the Continent, those of Switzerland, Holland, and Brittany. It is not in the deep alluvial beds alone that their relics are met with, but on the surface of the land, everywhere scattered, worked flints are found, which belonged to the same people, no doubt. It is, however, beneath the soil, buried during the countless years of the accumulation of the alluvial valley beds, not only that the most numerous traces of the early race are brought to light, but also it is in these gradually-formed beds that we obtain a clue to the *order* of the deposits, beginning with the lowest, and tracing the successive accumulations upwards. Thus, while the surface relics have been scattered and intermixed with earlier and later remains, the alluvial mud has been the vehicle for the preservation and transmission to our own times of relics in the order of time and place in which they were left. Next, then, to the discoveries made in the British Barrows and in undisturbed burial grounds, these deposits formed by the present rivers and periodical floods are most important for records of facts relating to the life and manners of man in prehistoric times. For the last fifteen years I have been on the look-out for any excavations going on in this neighbourhood. Among others, I learned that for a long time—more than twenty years previously—Brick-earth, for the purpose of manufacture, had been taken out at Mr. James Brown's works at Skitts Hill; that animal remains and worked tools and implements obtained from these grounds were in the possession of some few local persons, while, doubtless, others had been overlooked or allowed to fall again into oblivion. I am able to say that during the period above alluded to, every relic that has turned up has been scrupulously preserved, and, through the liberality of one or two other observers, and by instructions given to the workmen, all the recent finds have come into my possession. It was at the exhibition of these specimens (in part) at Braintree Vicarage, at the meeting of the Club on October 1st, 1898, that much interest was created, and a wish was expressed that I should write an account of my discoveries for the ESSEX NATURALIST.

The topography of the site and its surroundings is shown in

the portion of the 6in. Ordnance Map printed with Mr. Holmes' remarks on page 123, and more precisely in the Plan drawn up by Mr. Reader, on the 25in. Ord. Scale, with the accompanying explanations (page 97).

The Relative Position of the Alluvial Beds.

This will be best understood by a reference to the diagramatic outline sketch of the order of the deposits which I have drawn up (see diagram on p. 98) and to the Relic-Table on page 103. I have divided the Brick-earth, including the sandy ballast bed at the base, into five layers. Commencing with the lowest, the beds are reckoned in upward order. Below all these lies the London Clay, and on

EXPLANATION OF PLAN. FIG. 1.

The shaded portion adjoining the river represents:—from A to C the part excavated before Mr. Kenworthy's arrival in Braintree; from C to D the part excavated under Mr. Kenworthy's observation; from D to E a portion of the layer No. II. uncovered to the 9ft. level and about to be excavated. From E to F an unexcavated portion of the beds. F to G a small portion dug out to the lowest level.

The distribution of the principal relics is as follows:—

A—B. The flint knife (fig. 7). The workman say that more relics were found in this end of the excavations formerly, than at present.

B—C. Red deer skull with antlers sawn off (*Plate II*). Human frontal; antler haft (fig. 9).

C—D. Three red deer antlers, possibly used as picks. Bone handle (fig. 14). Antler handle (fig. 11).

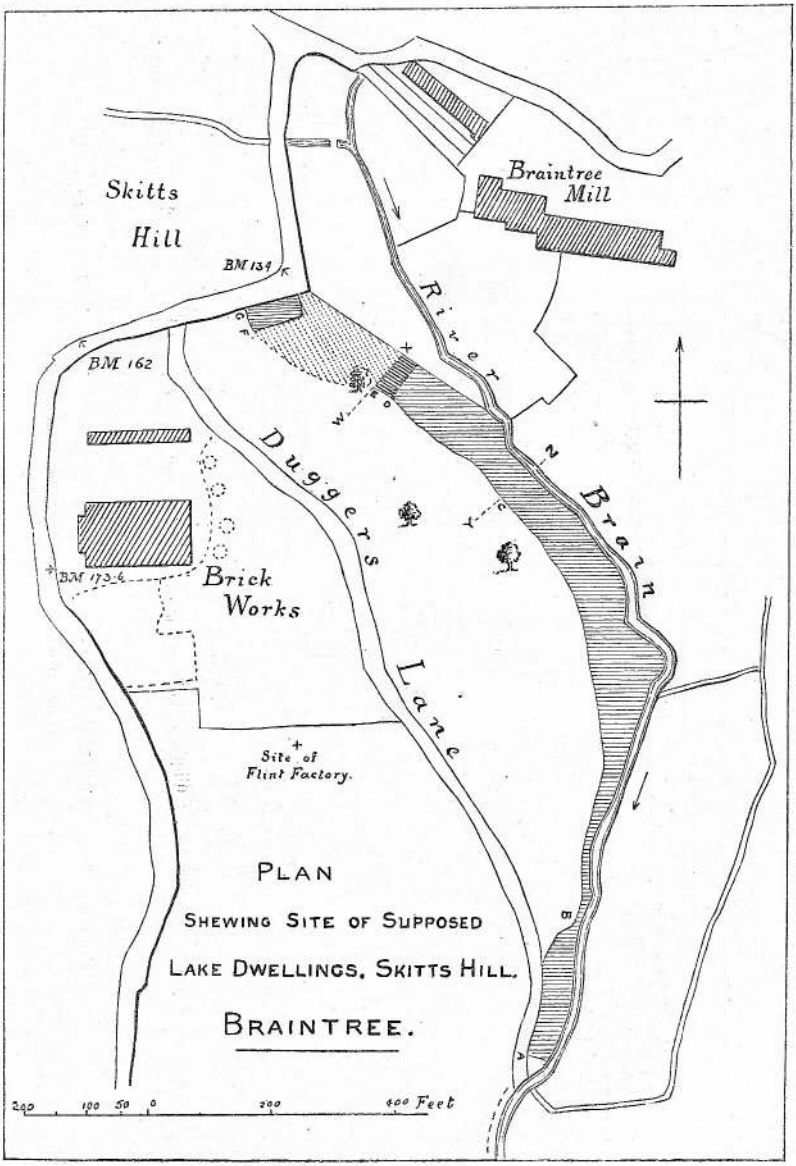
F—G. Flint arrow-head (fig. 8).

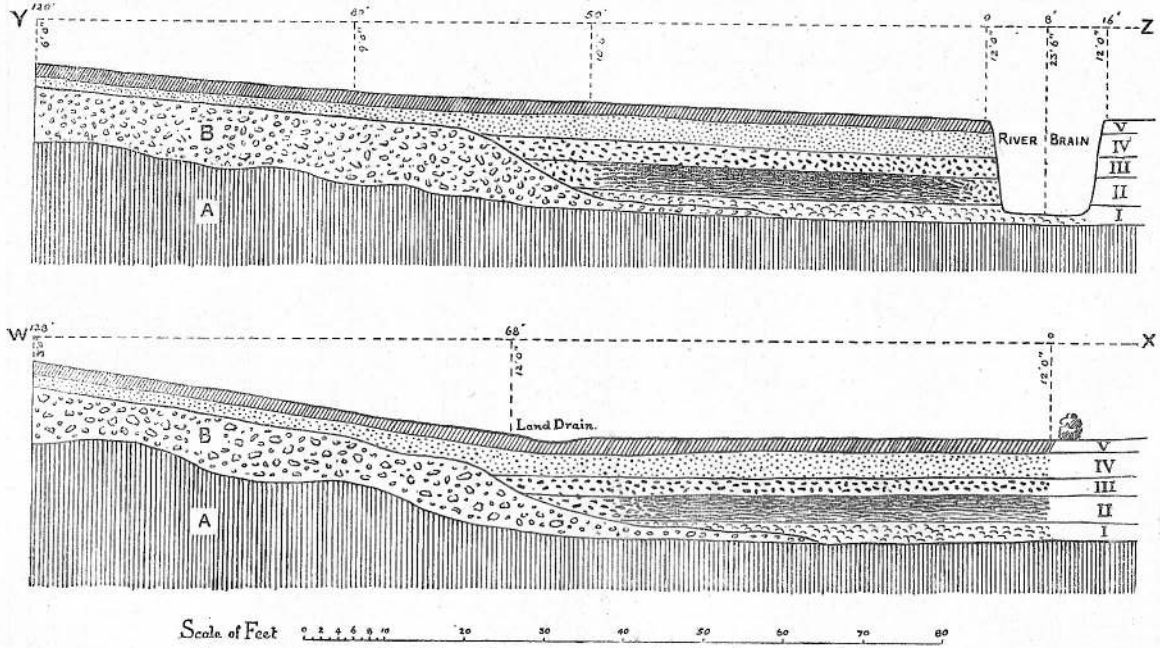
F.W.R.

the slopes of the valley, at a little distance from the river, there is a Pleistocence Brick-earth deposit, from which mammoth bones and Palæolithic "flint-flakes" have been taken by myself. The mammoth tooth, with bones of ox and horse, are in my collection previously deposited at the Field Club's Museum.

I.—The Ballast. This is the sand and gravel of the early river-bed, previous to the silting up. The place of this first bed is eroded out of London Clay.

II.—This constitutes the Neolithic [?] Bed where the earliest relics in point of age are found. It is partly made up of peaty clay, black mud, and sand, and the accumulations of the *debris* of the Lake-dwellers. It contained the objects which I shall describe below. The depth from the turf is about 6 feet, and for about 3 feet it contains stone-age relics.


Skitts
Hill
BM 134
BM 162
BM 173·6
Braintree
Mill
River Brain
Duggers
Lane
Brick
Works
Site of
Flint Factory.
PLAN
SHEWING SITE OF SUPPOSED
LAKE DWELLINGS, SKITTS HILL.
BRAINTREE.
200 100 50 0 200 400 Feet



FIGS. 2 and 3. Skitts Hill.—Diagram-sections showing the order of the Deposits.

(For explanation see opposite page).

III.—This bed is about two feet in depth, and contains Late Celtic Pottery.

IV.—Romano-British objects occur first at about a depth of four feet. I think that the silting-up has been much more rapid since the occupation by the Romans, owing, probably, to the destruction of the forest and its undergrowth, the land cultivation, and the baring of the virgin soil. Bearing this consideration in mind, we may say that the pre-historic accumulation was, perhaps, ten times slower than the Roman, and that of recent years much more rapid than the Roman and Mediæval.

V.– This is the Post-Roman and Mediæval layer, and here iron horse-shoes occur in numbers, with fragments of glazed pottery.

EXPLANATION OF SECTIONS. FIGS. 2 AND 3.

Section I. on line Y Z of Plan (p. 97) was taken on the spot when Mr. Kenworthy's observations commenced. At this point the digging is carried to the present river's edge.

Section II. on line W X of Plan, marks the point to which the excavations have reached. The cutting stops at the hedge some 50 feet before reaching the river.

The Relic-bearing Bed No. II. is shaded darker at the top to indicate that more traces of fire have been noticed here than in the lower parts of the bed. The shading dies out as this bed approaches its old shore, and the present river to show the extent of the artificial mixture (*Packwerk*). –F.W.R.

B. Pleistocene Brick-earth. The original Lake or River bank.

A. London Clay.

Site of the Dwelling-places.

If it be necessary to show that *upright* piles were found *in situ*, on which a platform of wood could be erected by the dwellers, in order to prove that the Skitts Hill site was a Lake-habitation, I cannot say for a certainty that it was so. Many of the logs of wood were found in a leaning position ; the stems of trees, deprived of their roots and torn-off branches, amounted to hundreds. The logs were placed in position by man, and they were staked and secured in their place from the scour of the floods. Among the *debris*, logs of various woods, such as fir, spruce, elm, beech, oak, birch, abounded, and maple in small pieces. Speaking generally, the oak remains are quite hard and sound, and some pieces were much harder than in the fresh condition. The Faggot or "Fascine" Dwellings at Skitts Hill, I believe to have been contemporary with the Pile-dwellings. Both kinds have been found in many parts of England, as well

as in Holland, in Brittany, and Switzerland, and with them are associated relics of the stone-age, while the dwelling-places themselves continued to be occupied in later times. At Skitts Hill an artificial floor was raised above the level of the water. This floor was carefully formed by mixing together clay, sand,

FIG. 4. Diagram of suggested method of shaping wooden stakes.

gravel-stones, brown mottled clay, and chalky boulder-clay, forming a mixture which could only be produced by human contrivance and human hands. To support and secure this artificial concretion, wooden stakes were driven into the ballast of the lake or river. Outside the raised platform there was still water, in which the peaty mud has accumulated until it has levelled all up; and it was, no doubt, into this water which surrounded the floor on which the huts were built that numerous relics fell, or were swept by the dwellers. So large was the quantity of wood and other material used to construct this platform, that in the course of years some tons have been dug out by Mr. Brown's workmen, and afterwards returned to fill up the excavations. The distance of the platform to the land was about 10 feet; I measured it as nearly as I could. In one

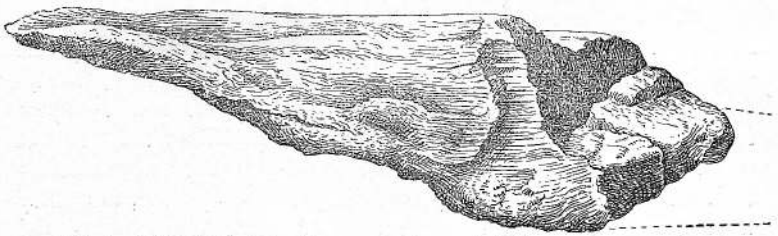


FIG. 5. End of pointed stake, probably made in the manner mentioned in text. One-fourth natural size.

instance, an oak tree had its stem, without root, about 15 feet long, set towards the land, as though to form a gangway.

The artificial relics found at this level belong to an age prior to the use of metal. [? Ed.] The method employed for splitting and parting the timber into lengths shows the use of bone or

stone tools only.[2] For instance, logs of oak, four or five inches in diameter, may have been divided across in the following manner:— A deep cut was made on each side of the log at distances nearly a foot from each other; then the timber was smashed into two by some heavy weight, perhaps a log of wood, being let fall on the weakened part, fig 4. This idea of the method employed is suggested by a cut stake which has been preserved (see fig. 5). And the other drawing (fig. 6) represents how such a stake may have been employed. The result was two pieces of timber with staked ends. The number of split logs and thick planks found was also very great. The description given by Dr. Keller, in his *Lake Dwellings of Switzerland*, applies well to the methods I

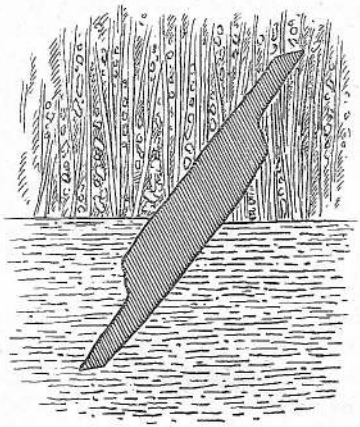


FIG. 6. Suggested plan of employing roughly pointed wooden stakes.

suppose to have been employed at Skitts Hill in the fashioning of the fascine dwelling-places. We read thus (Vol. I, pp. 6-7):—

"Some Lake-dwellings were not supported upon piles, but rested upon "layers of sticks, or small stems of trees, built up from the bottom of the "lake, till the structure reached above the water mark, and on this platform "the huts were placed."

"The Crannogs of Ireland and Scotland were built up from the bottom "of the lake, on the soft mud, exactly in the manner of fascine dwellings of "Switzerland. The bed for the floor is a mass of ferns, branches, and other "vegetable matter, covered over with a layer of split or round logs, and above "this a quantity of clay, sand, gravel, and stones."

The above is an exact description of our Braintree dwelling-places. The mass of leaves, sticks, nuts, acorns, &c., found mixed up with the clay of the platforms, looks like stuff gathered

2 [This is, however, a doubtful point; see Mr. Reader's remarks at the end of the paper.—ED.]

up in the autumn from the forest floor; and this was done, no doubt, each year, in order to form a fresh floor for the winter. In this way we may account for the immense quantity of vegetable matter brought together. There is no evidence to show whether the platforms were rounded or square, but it is certain that they did not extend far into the lake, and that they were placed within easy distance from the land side and were joined to it by a faggot road made like the raised floors. These dwellings, and the occupation of them, lasted so long as to come down to the period when finer clay for pottery was used, with vessels of thinner walls, more perfectly burnt, and of a more graceful form and when cooking was carried on in earthenware pots. Probably, some kind of occupation continued with the un-Romanized inhabitants of this part of Britain, down to the end of the Roman period, judging from the numerous objects of the Romano-British period, found in the layer (No. 3) above.

LIST OF THE VARIOUS ARTICLES FOUND IN THE EXCAVATIONS AT SKITTS HILL.

The objects which have been preserved, and which I have presented to the Essex Field Club, may be classified as Human and Animal Remains, Stone, Bone, and Wooden Implements, and Pottery.

Of the first the only specimen found in the relic-bed was a *Human Frontal Bone*. There is a lineal mark across the forehead, which Mr. Newton considers to be merely an iron stain, and not a healed fracture, as was at first imagined.

Animal Remains—Bones.

The bones of animals which have been identified may be treated under the heads of (*a*) Wild animals and (*b*) Domestic animals. Such of the wild animals as were found were common in Britain during the Neolithic age, and were, no doubt, abundant in the forest lands adjacent to our settlement. Some survived into Roman times, but most of them have been long absent from our district.

THE CELTIC SHORT-HORNED OX (*Bos longifrons*).—This is abundantly in evidence in the shape of various fragments. Several specimens of the upper part of the skull, of limb bones, many of these being fractured or split, possibly to obtain the marrow.

A LARGE OX.—Some bones of a much larger ox have been found, but it is not certain that they represent the URUS (*Bos taurus*). These bones must have belonged to animals much

larger than those of the *Bos longifrons*, too large, one would think, to be easily domesticated by the Stone-age folk. Yet the animal seems to have been captured, and apparently used for food. They were mixed up with the wood of the relic-bed.

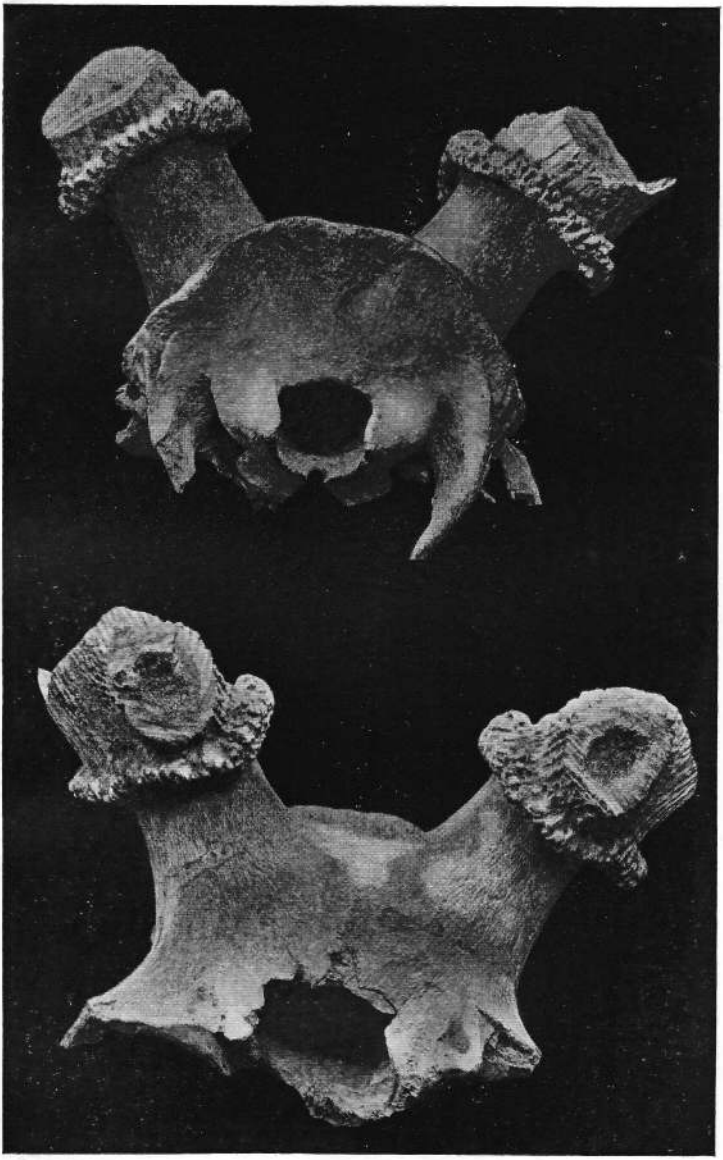
RELIC-TABLE—SHOWING THE ORDER AND NATURE OF THE DEPOSITS AND OBJECTS FOUND.

No. and Depth of Layer.	Period.	Order and Nature of the Deposits.	Relics.
V. 1ft. 6in.	MODERN and MEDIÆVAL	SURFACE SOIL BRICK EARTH.	Glazed Pottery and Iron Horse-shoes.
IV. 3ft.	ROMANO-BRITISH.	BRICK-EARTH & VALLEY SILT. ORGANIC OBJECTS NEARLY ABSENT	Flue-tiles. Fragments of Pottery coarse and fine. Oyster shells.
III. 2ft	PRE-ROMAN	SANDY CLAY & CLAYEY EARTH with SELECTED PEBBLES	Fragments of Early and Late Celtic Pottery, thin, gritty, wheel-turned and kiln-dried. Chiefly used for cooking. The Bones in this section are friable and earthy, many too decayed to be preserved. Large ox, horse-teeth and limb-bones.
II. 3ft. 6in.	NEOLITHIC. This is the bed referred to in text as the "Relic-bed."	LAKE MUD with DECOMPOSED ORGANIC MATTER. ARTIFICIAL PLATFORMS raised to the level of the original Lake or River, and resting on the BALLAST (No. 1)	Human frontal. Bones of Ox, Red and Roe Deer, Goat, Wild Boar, Pig and Dog. Flint knife; flint arrow-head; three antler-implements; three shed antlers (? picks); two bone handles; wooden implement. Large quantities of nuts, acorns, wood split and cut; charcoal, ashes and burnt flints.
I. 2ft.	POST-GLACIAL. The Bed of the River	RIVER BALLAST SAND & GRAVEL	
B.	The original Lake or River Bank	PLEISTOCENE BRICK-EARTH	A few large Pleistocene Bones, teeth of Mammoth and Palæolithic flints.
A.		LONDON CLAY.	Some large Erratics, quartzite and conglomerates, resting on the surface.

THE STAG OR RED DEER (*Cervus elaphus*) is well represented by its antlers and bones. It was never domesticated; its shed antlers were, no doubt, brought into the dwellings from the forest to serve various purposes, such as the making of tools or weapons. It is much more uncommon to find the skull with the antlers attached, than to find the shed antlers, which were probably picked up in the forest. The strength and ferocity of the stag made it difficult and dangerous to capture by men armed only with weapons of bone, wood, or stone. There must have been great necessity for the unshed antlers in making flint hafts, to induce men in those days to capture the animal and take the great trouble to saw off the antlers from the head. The unshed antler, from its denser condition, would be more serviceable for the hunter's use in the making of handles for tools and implements, than the lighter shed antlers.

[Amongst the remains of this animal is a cranium wanting the whole of the facial portions. (See Plate II.) The frontal bones have been crushed in, but probably since the animals death, as it would be difficult to strike this spot when the creature was alive and with the brow tynes perfect. The antlers and brow tynes have been *sawn* off just above the "burrs," which still remain and are very rugose, indicating well developed antlers. The marks left by the saw are rough and irregular, showing that the saw was a coarse one and the operator not skilled in such work; but at the same time these marks could only, I think, have been made by a metal saw.—E.T.N.]

THE ROE DEER (*Capreolus caprea*).—Compared with the Red Deer, the Roe is scarce at Braintree, but I have the right under-jaw of a very aged animal, with perfect molars in place, interesting in showing signs of long use, being much worn. This jaw, I believe, was found in the relic-bearing bed No. 2, 9 feet down, but it is quite possible that it may belong to the underlying Pleistocene bed. Detached pieces of antler were found, which had apparently been put to some manual use, and were probably adapted from shed antlers. In one case I have secured, from the relic-bed, a pair of antlers of this graceful creature, which was abundant in the Essex Forests in pre-Roman times, but probably was soon afterwards extirpated. The horns in this case are as fresh as in the life-time of the bearer of them, and as firmly attached to the skull; the skull has been apparently, trimmed off, as is the fashion of mounting antlers in recent times. Why should not Stone-age man have



Cranium of Red Deer, showing places where antlers and brow tynes have been sawn off. For explanation see text.

treasured the signs of his conquests, as the Central African and North American continue to do to this day, and have done from the earliest ages?

GOAT (*Capra hircus*).—[A skull in a fair state of preservation, with tolerably long horn-cores, is an undoubted representative of this creature, and a piece of a pelvis most probably is referable to the same form.—E.T.N.]

WILD BOAR (*Sus scrofa-ferox*).—Found at the 9 feet level. [The Wild Boar is evidently represented by the anterior portion of a very large lower jaw, with extremely powerful tusks. One of the tusks measures 26.5 mm. across the inner and curved enamelled surface at the base, and 200 mm. long round the outer curve, a half of which protrudes from the jaw. Another piece of a lower jaw of a much smaller and younger animal, as well as a tibia and a foot-bone, are all the remains of this species that have come to hand. Some of these remains may have belonged to domestic animals.—E.T.N.]

THE HORSE.—The horse does not occur in the relic-bed; it is only in the middle or upper stages of the alluvial deposit that these bones are met with. We have the limb bones, upper and lower jaws of several individuals, and teeth were plentiful. Some of the bones seem to have belonged to a smaller animal. (Query—pony or ass?) There is a variety in the size of the limb bones and teeth.

DOG.—Portions of two skulls, perhaps of three. One skull is 6½ inches from the occiput to the muzzle, and the animal would have been about the size of a modern collie. The bone was at first jet black; it was found on the bottom of the relic-bed. There are also the femur and tibia of a large dog or wolf.

Human Workmanship; Remains of Burnt Bones, and Charcoal.

The traces of human workmanship are apparent upon a large proportion of wood, bone, and other fragments found in the excavations. In connection with fire employed by the dwellers, it is important to observe the large quantity of ashes and charcoal, with calcined pebbles and "pot-boilers," at the bottom of the lake and upon the platform upon which the huts were built. Much blackened *debris* was thrown out by the inhabitants of the huts, and sank into the marsh. Signs of workmanship abound in the squaring, splitting, and pointing of logs, chopping of stems, and

pointing of stakes. Not much of this material could be kept for inspection; large stems and trunks of trees—elm and oak—were thrown back into the excavated pit. But I have saved a few stakes, showing careful pointing. I have cut up some of the oak and polished pieces, as examples of solidity and fine material, of which bog-oak ornaments might be made. I took sketches of oak poles cut partly through on each side, and then broken in two, so as to furnish a pair of pointed stakes from one piece. I have still an oak pile, pointed at both ends, measuring about 9 feet in length and 5 inches in diameter. The chopped-off twigs of all kind of woods then in growth are found mixed up with stiff clay, sand, and gravel, along with nuts, acorns, and leaves, to form the floor of the habitation. The prevailing twigs identified are of birch; the bark is still bright and glossy. The most decayed examples of piles and logs are of elm. I think that there is much fir. Yew is found, and the wood is still hard, and capable of taking a high polish. The oak stakes were squared and split in a rude and primitive manner.

Stone Implements and "Flakes."

No large celt of the polished kind has been found in the relic-bearing bed. A portion of a polished celt is in my collection at the Club's Museum. This was found near the site and on the bank of the Pod brook. Numbers of finely-made and well-polished celts have been found in and near Braintree. I found two finely-chipped flint javelins, leaf-shaped, of the long or oval Barrow period, in conjunction with four polished celts of porcelain texture, at Kelvedon (these are in the Club's Museum). A javelin of exactly the same kind was found in the deep beds of the settlement associated with flakes and bones (see fig. 7). I therefore conclude that large polished stone celts belong to, and may yet be found at, Skitts Hill.

A Hammer-stone or Axe was found in the valley, on the surface, within a few hundred yards of the settlement. It is slightly damaged on the underside. It is in length 6 ins., 3 ins. wide in the middle, and brought to a blunt point at both ends; weight, 2 lbs.; made from a dark basalt or quartzite stone, rubbed to a smooth surface. This agrees with such as are found in Denmark, undrilled, and made to be used in the hand, without hafting, and it is identical with one in the Christy collection, British Museum.

The following implements were actually found *in* the Relic-bed:—

FLINT KNIFE OR DAGGER.—[This very fine implement was found in the early period of the excavations in the part marked A—B on the plan (page 97), and is in the possession of Mr. Davis, the Head-master of the Board School at Braintree. Through his kindness I am able to present a photograph of it

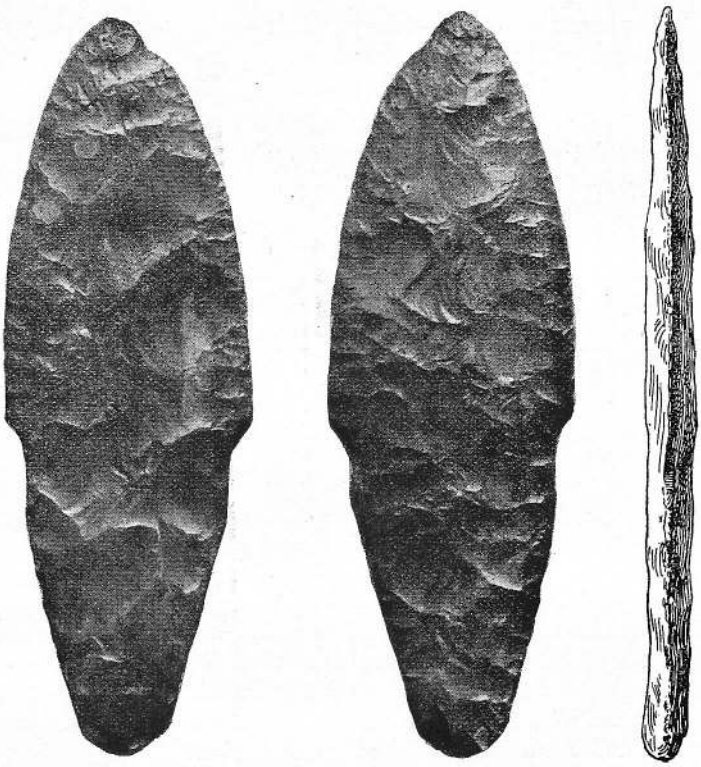


FIG. 7. Flint Knife or Dagger from Skitts Hill Two-thirds size. With edge view of same.

here (Fig. 7). I have tried to persuade him to add this to the objects in the collection when they are placed in the Essex Field Club's Natural History Museum at Stratford. I trust that when he sees the other parts of the collection installed there he may do so. The implement measures $5\frac{3}{4}$ inches in length and 2 inches at the greatest width. A similar specimen is figured in Evan's *Stone Implements*, page 349, fig. 264.—F.W.R.]

ARROW-HEADS.—One finely-clipped, barbed and stemmed arrow-point is in the Skitts Hill collection (fig. 8). I found it here a few years ago. But such finely-clipped arrow-heads are very rarely turned up in the dwelling-place at Skitts Hill. Among the worked flakes, of which there are hundreds, there are numerous pointed ones of a size from $\frac{3}{4}$-ths to $1\frac{1}{2}$ inches long, which may have been utilized for tipping arrows.

POUNDING-STONES.—Many water-washed pebbles were collected which exhibited signs of use.

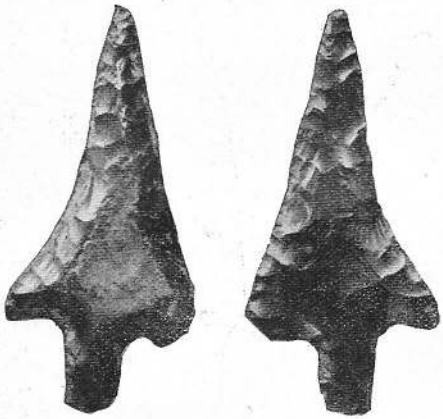


FIG. 8. Flint arrow-head from Skitts Hill. Full size.

SANDSTONE SHARPENER.—Square-sided and oblong $1\frac{1}{2}$ inches by 1 in.; length 4 inches; probably used for grinding; found with flints and worked bones in the bottom bed. The base rests steadily on a flat, the top is rubbed into a slightly concave surface, and has a finely-finished grinding plane.

FLINT FLAKES.—Numerous diminutive and delicately-formed flakes are found, for what purpose used it would be hard to say. They are of very varying forms, with sharp edges and bulbs of percussion, some only $\frac{3}{8}$-ths inch in width, and $1\frac{1}{2}$ in. in length, have a clear bulb, butt, and sharp point, two sharp ridges, three facets, and two ridges on the upper side. Nothing in the way of worked flints can exceed them in delicacy. These very delicate flints may belong to the higher level of the

beds. I do not remember taking them from the peaty horizon, where the larger and stronger flakes were found *in situ* by me.[3]

The worked flints, chips and fine flakes, are so numerous as to suggest that the population was considerable, and that the dwellings were in close proximity to a manufacturing ground of these objects. On the southern slope of the valley, at an elevation of 30 feet, and a hundred yards distant, operations for excavating brick-making material are likewise in progress. The Brick-earth here is formed of rain-wash from the higher ground. In neolithic times the surface on the slope was about 2 ft. 6 in. below the present level. It is at this depth that flakes, identical with those in the dwellings, occur in large quantities, many of which are worked from rolled pebbles. These pebbles were evidently carefully selected. The cores are abundant on this valley working-ground, and not on other sites. The time that has elapsed since the flakes were worked has sufficed for the deposition of two feet of *Talus*, while the action of the river has accumulated six feet of alluvium. From the first I kept the two sets of flints separate, thinking that they might belong to a different period or race of men; now I feel convinced that both are from the same source. This point is of great interest, as it tends to show that the dwelling-places were in the bottom of the valley, surrounded by water, whilst the working-ground was on the slope.[3A] Only the flints and very sparse scraps of pottery are found on the slope. The dry brick-earth may not have been conducive to the preservation of bone and wood. Sometimes a small "nest" of flakes, together with the cores from which they were struck, lay at a depth of two or three feet, while others were found scattered at intervals over all parts of the excavated brick-field. This was probably the result of long occupation by the settlers. They were therefore fixed to the locality at least some portion of the year, either summer or winter.

Bone and Horn Implements.

The most striking and important of these are such as are formed from the antlers of Red Deer. They appear to be

3 Mr. W. J. L. Abbott, in his three papers on the "Hastings Kitchen Middens," places these small implements in the bronze age. The suggestions of Mr. Abbott open out a chapter in the history of flint manufacture which is not touched in the standard comprehensive works on the subject. I do not think that they were worked out of our chalk flints. I have some very small flakes of the same kind from the banks of the Lea River in Hackney Marshes. See remarks on (and plates of) these minute implements in *Journ. Anthrop. Institute*, vol. xxv., plates 11, 12, and 13.

3A See Plan, at spot marked "Flint factory site."

identical with deer-antler implements from the Barrows, Grimes Graves, and Cissbury, and can be matched with those figured by Canon Grenwell in his *British Barrows* (page 43).

[(*a*) A hammer axe of staghorn, perforated for a handle and bored for hafting an implement. Five inches in length. Fig. 9, Pl. III.

(*b*) A tool of unknown use. The surface has been scraped smooth and the end has been ground and polished, apparently from use. The centre part of this end has been slightly hollowed,

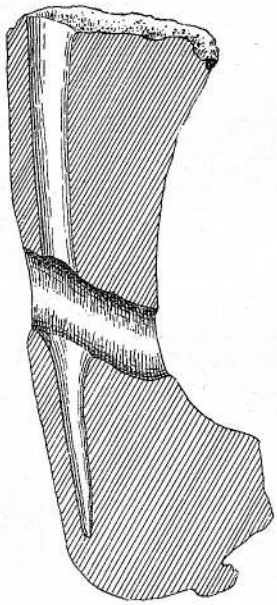


FIG. 12 Section of Stag-antler handle, illustrated Fig. 11, Plate III.

but not enough to suppose use for hafting. The perforation at the other extremity has apparently been broken. Length 5¼ inches. Fig. 10, Pl. III.

(*c*) Implement of staghorn, pierced as is usual with these objects, only in a transverse direction. Fig. 11, Pl. III. It has also a tapering, vertical boring running almost its entire length. (See section at Fig. 12.) The form of this implement suggests a handle of some metal tool, and also appears to be worn smooth by the grasp of the hand. It seems to be an uncommon type. Length 6¼ inches.—F.W.R.]

FIG. 9.

FIG. 10.

FIG. 11.

Three implements made from Red Deer Antlers. For explanation see text. Two-thirds natural size.

(*d*) Several detached tines of Red Deer were found, which may have been used as boring tools.

(*e*) Three Picks, made from Red Deer's antlers. Two are illustrated by Figs. 12 and 13. Two are quite perfect, of a type identical with Canon Greenwell's figure 34, page 43, of

FIGS. 12 and 13. Two picks made from Antlers of Red Deer. One fourth natural size.

his *British Barrows*. One implement measures 18½ inches, and is a remarkably good example of a pick of the pre-historic age.

(*f*) Two bone handles for holding a tool or weapon; they are each formed from the tibia of the ox, and bear marks of much usage. One of these is represented here, fig. 14.

(*g*) Three hand hammers—one from the os sacrum of ox (circumference 10½ inches); two others from the distal tibiæ of the *Bos longifrons*. The surface is cut everywhere with a pointed tool of flint. This faint tooling is difficult to describe or to represent; but the same kind of workmanship will be found noticed in the description given of a Lake-dwelling discovered at Ehenside Tarn in Cumberland, which was first reported and described in an article by myself, and afterwards more fully treated by Mr. R. D. Darbishire, F.G.S., in the *Archæologia*, vol. xliv., pp. 273, 292. The work seems done with a sharp-pointed flint, and carefully chiselled over by even short cuts.

Wooden Implements.

These may have been numerous during the stone period, as, for example, to supply the hafts for drilled horns, &c.; but

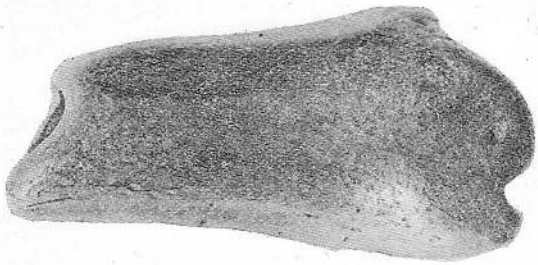


FIG. 14. Bone handle Two-thirds natural size.

owing to such relics being mixed up with leaves and branches, the workmen would not readily discover or distinguish them from the surrounding pieces of natural wood.

(*a*) An implement of maple (Fig. 15), measuring 4 feet 7 inches in length; greatest width 2¼ inches, and narrowest width 1½ inches; of a thickness to suit the hand, sharpened to a spear-point at one end, and rounded at the butt, with hand-grips for use as a spear or more probably as a paddle. Only few of similar implements have come into the collector's hands, and from experience I can say that care must be taken in drying and soaking such relics in glycerine, to save them from warping and cracking, or even perishing altogether. This process has been adopted with the implement now described, and the result is its almost perfect

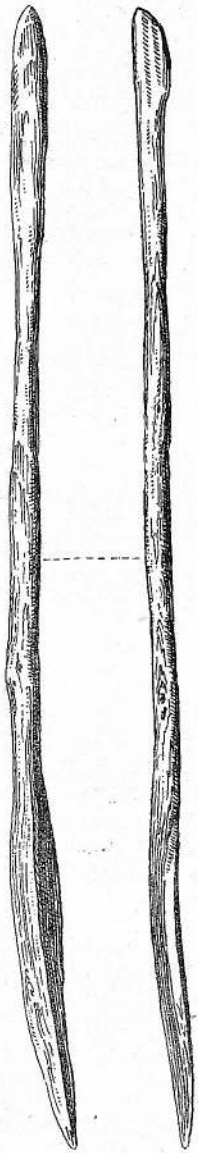


FIG. 15. An implement of maple wood from Skitts Hill. One-ninth full size.

preservation. Beyond the pointed stakes, the spear, and wedges, no other wooden instruments have been discovered; but the tree stems deprived of their roots, the larger branches deprived of twigs, and the twigs cut into short pieces from 2 to 5 or 6 inches were dug out all along the line of the dwellings in large quantities and returned for filling in the pits.

Pottery.

[The only pottery which has been definitely recorded as coming from the relic-bed are some fragments of thick grey ware. The portion of the base which is represented in Fig. 16, is rough and coarsely made, but cannot with certainty be said to be hand-made. The other fragments appear to belong to the same vessel, but bear evident marks of being wheel turned.

Of the unrecorded pottery there is one fragment which appears to be of the Bronze-age quality, red and apparently hand-made, but not ornamented. All the other fragments are the ordinary Late Celtic or Romano-British specimens. Some of these are supposed to have come from the relic bed, but as an exact record has not been kept they cannot be included.—F.W.R.]

ROMAN POTTERY.—This occurred in the higher level (No. IV. on Section, p. 98) from a depth of 1ft. 6in. to 4ft. 6in. from the surface. It consists of earthenware, perfectly burnt, and similar to that found commonly in places of Roman occupation. It is all in a very scrappy state, as if broken and thrown away as refuse. Flue and roof tiles, the former with striations for holding mortar, the latter with flanges for the overlapping tile.

[Some substance resembling Red Ochre was found on the bottom of the Relic-bed. On this Mr. F. W. Rudler, F.G.S., has kindly reported as follows :—

Two pieces of a fine laminated sandy clay, coloured with oxide of iron, forming a peach-blossom coloured ochre, which gives a good streak, and might have been used as a pale reddle. Mr C. Reid does not know any material like it among the rocks of East Anglia, and suggest that it may have been derived from the Trias.—F. W. RUDLER.]

IRON RELICS.—Some Horse-shoes were found nearer the surface ; of these, several belong to small animals the size of a cob ; they occur at a high level, but the pattern is mediæval type ; a small space is left for the frog ; the rim is $1\frac{1}{2}$ inches wide ; there are nail holes, but no tips front or back ; the bottom

PIG. 16. Fragment of base of vessel from Skitts Hill. One-half size.

is distinctly convex for the tread. This kind of horse-shoe is usually called Roman ; but I doubt the correctness of the term ; it would be better to call them Saxon, Danish, or Norman, for we know that these people shod their horses by nailing the shoes on.

NOTES BY THE AUTHOR.

The Cause of the Preservation of Some of the Objects.

The condition of the bones at various levels varies much. Those found in the lowest bed are almost perfect, for these sank under the gently-moving water at the margin of a broad lake, and were subsequently enveloped in the lake mud, mixed with vegetable growth and decayed weeds and rushes. Under these conditions the bones obtained the smooth, glossy, and unctuous

state which many still retain. In the drier overlaying beds, the condition of the specimens was different; there the bones were left on the surface of the soil, exposed to atmospheric influences before being finally covered up by the floods, and they are therefore generally very earthy, and, in many cases, completely decayed. In the lowest bed, at the depth of 9 to 10 feet, not only the bones, but leaves, grasses, rushes, acorns, &c., have been saved from decay by the anti-septic action of the peaty matter. The objects, like the material in which they were enveloped, were stained of various hues of green, red, and bluish-black, by the percolation of coloured fluid. Whole spadesfull of the earth were noticed to be deeply coloured when first lifted up.

General Conclusions.

One of the first questions which suggests itself in taking a retrospect of the subject is—what could have been the motive which led early man to form lake-settlements and habitations? Light may be thrown upon this by a comparison of the settlement now under notice with those of Switzerland, so fully treated of by Dr. Keller and other Continental writers, and from the summary of their works given by Stevens in *Flint Chips*. Their conclusions are that the motive was the desire of protection and defence, in the first place, against the wild animals, and, secondly, against the aborigines who, it is suggested, might have been fierce enemies of the Lake-dwelling invaders and colonizers.

Taking the evidence of the flints, we come to the conclusion that Neolithic man here, at Braintree, lived in villages, and had their settled habitations within, or very near, the watercourse and sloping ground suitable for cultivation. At the same time, they were herders of tame cattle, as well as hunters in the forests. The river served two purposes to the dwellers—giving a constant water-supply, and a line of defence from predatory man and beast. It is most probable that both sides of the valley were occupied by the same people; and, in fact, on the opposite side of the Pods brook and its slope traces of workings or of habitations have been discovered.

Whether the lake-habitations at Skitts Hill belong to the earliest Neolithic settlers in this locality, or not; or whether there were in the district earlier and ruder men of the Stone-age before the arrival of the lake-dwellers; or whether this

method of construction of habitations was imported from the Continent; these are questions we cannot at present decide. But from the examination of the site and remains at Skitts Hill, we may reasonably conclude that we have here very early habitations, and that in these we have traces of Neolithic man in this district. It has been suggested by some that the greater part of Essex was so much occupied by primæval forest that there was little room left for primitive man, and that, for the most part, the land was occupied by wild animals. Confining our observations to Great Britain, and comparing Essex with the more open plains and moorlands, such as Salisbury Plain, Grims Dyke country, and the Wolds of Yorkshire, it may be that on account of the abundance of timber, Essex was less favourable for the settlement of men of the Stone-age and later times, and, in consequence, they were not so numerous. For men possessing only stone and other primitive tools, forest clearing would be a difficult undertaking, and for that reason, if for no other, the numerous valleys and margins of streams were inhabited before the higher grounds, and, probably, at the earliest arrival of Neolithic man. And here, at Skitts Hill, have been found what we take to have been one of these early settlements, just where we might expect, namely, in proximity to the river and upon the lower grounds. When once the Lake-settlements were formed, they, no doubt, survived throughout long epochs, and may have continued during the Stone, Bronze, and Iron periods. This seems to be a reasonable deduction, and one supported by comparison with like discoveries. And such settlements as that at Skitts Hill may really be numerous, but concealed from observation by alluvial accumulations, which will be removed in the future for the purposes of the brick-making industry. These valley beds are less-frequently disturbed than the pleistocene deposits on higher ground, which are excavated for the sake of loams and gravels. Hence the interest of the Skitts Hill discovery, and the importance of preserving the objects found, as a clue to future discoveries in this branch of local archæology.

All the objects described in this paper are now placed in the possession of the Essex Field Club for exhibition in the County Museum of Natural History, my wish being that they may form an object-lesson to those who, like myself, are seeking on every occasion to find and record any new facts

which may add to the accumulated materials for a better knowledge of ante-historic man in our country.[4]

REMARKS BY F. W. READER.

It may be remembered, by those who were present when Mr. Kenworthy's paper was read at the meeting of the Club, that a considerable discussion was raised as to whether his discoveries related to a *Lake Dwelling*, or to the results of alluvial wash.

As I have since then had the pleasure of assisting Mr. Kenworthy and Mr. Cole in the preparation of the paper for the Club's journal, and have spent a week at Braintree, making the Plan and Sections already given in this paper, and otherwise investigating the matter, it has been suggested that some remarks from me might be of interest.

With regard to Mr. Kenworthy's conclusions, I think that he has, in the main, ample grounds on which to base them; but I also think they should be considered as tentative only. For the present the record should be regarded more as a basis for future observation than as in anyway complete or conclusive.

There are one or two points that should be remembered in considering this subject. In the first place, the excavations are being carried out to obtain brick earth, and not for archæological research. Then it is only quite in the latter stage of his observations that Mr. Kenworthy developed the idea that layer No. II. (see section on p. 98) was an artificial bed; consequently, much that might have been valuable evidence may have been overlooked, such as the splitting, shaping, and position of the stakes. For the same reason, the exact level of many of the apparently less important relics has not been recorded, more particularly the *pottery*. This is unfortunate, as pottery affords one of the best means of evidence of the period of such remains. Further, the black peaty soil of this bed renders objects very difficult of recognition, and in the absence of continuous watching by trained observers, no doubt much has been missed.

I do not intend to make these remarks in a critical spirit, but rather as explanatory. I consider Mr. Kenworthy's patient

4 [It is much to be wished that all finders and possessors of objects of the kind would follow Mr. Kenworthy's enlightened policy. In our county alone there are hundreds of specimens in private hands practically useless playthings to their owners and always liable to be lost or mislaid, but which if deposited in one or other of our local museums would be preserved with others of their kind, and would ultimately form most valuable scientific evidence for the use of future workers in like subjects.—ED.]

and prolonged observations worthy of the highest praise, and feel confident that he has drawn attention to a matter that may prove to be of great interest and importance.

There still remains about 200 superficial feet of this deposit in the same meadow awaiting excavation, which operation will probably extend over several years. This is the portion marked on the Plan at page 97 between DE and F. It will be noticed that as the excavation approaches the road it runs away from the river; the portion of the meadow adjoining the river having been purchased so as to prevent these diggings encroaching too nearly on the Braintree Mill premises.

This is a great misfortune for the Lake Dwelling researches. Should the proprietors of the Brick Works ever carry out excavations on the other side of the road, I think that still more might be found, as here the old river bed widens out considerably, and suggests a more favourable spot for such a settlement than the narrow strip represented by the portion already excavated.

The points in favour of this bed being artificial are the curious mixture of which it is composed, which corresponds with similar beds known as "*Packwerk*," met with in the Continental Lake Dwelling sites of "Fascine" formation, and that this mixture dies out as the bed approaches the old shore and the present river. I have indicated this by the shading on the Section. That it was constructed and then occupied rather than being a gradual accretion is shewn by the fact that the burnt flints, ashes, and traces of fire occur mostly on the top of this layer. The portion of this layer which is at present exposed (D—E on Plan) was, when I first saw it, covered with ashes and burnt flints, apparently a hearth; but on turning it over, the traces of fire disappeared after a few inches.

The preserved evidence of the pinning of the bed by shaped stakes, exists only in the one specimen (fig. 5); but Mr. Kenworthy remembers to have seen others that had apparently been split and shaped in a similar manner. His idea of the splitting of these stakes is ingenious, but requires, I think, more evidence to confirm it. This is a point that should be carefully watched in the future digging—where and how vertical stakes occur. A Terramara formed with vertical inclined stakes, discovered at Castione, is described and illustrated in Munro's *Lake Dwellings*, p. 253, fig. 82, and is interesting by way of comparison.

An endeavour should be made to determine the shape of the foundations of the dwellings—whether these represent a cluster

of detached huts with passages between, or form a continuous platform. It has been noticed that portions of this layer were different from the rest, and the relics found in them were stained a different colour. This might be caused by the accumulation in the passage between the huts, and in such a deposit one would expect to find the most relics.

Concerning the age of this layer, I do not think there is any positive evidence of its construction in Neolithic times, although such may be the case, and its occupation may have been continued through and beyond the Bronze Age, as Mr. Kenworthy suggests. The great majority of the relics might point equally to the Bronze Age or to Neolithic times. The Stone Implements—the knife (fig. 7) and the arrowhead (fig. 8) with its fully developed tangs—are such as were used down into Romano-British times. There is little to guide us in the pottery, as the only pieces which can with certainty be said to have come from this level, are some fragments of the large vessel referred to before, the portion of the base of which is represented (fig. 16). The base is much coarser than the other fragments, but I think this may be due to its having been placed on twigs and straw to dry before firing. The other portions undoubtedly show marks of having been wheel-turned.

There is but one small fragment which can be said to be hand-made and to resemble the pottery of the Stone or Bronze Age, and the exact locality of this has not been recorded. At the same time, some of the ordinary Late Celtic pottery, such as occurs plentifully in the level above (No. III.), is supposed to have come from this level, but as an accurate record has not been kept, this point must be deferred for future investigation.

The fact that no bronze or metal objects have come to light from this bed may perhaps be accounted for by the difficulty of recognising objects in the black peaty soil of which it is composed. It is also to be noted that no metal objects have been found in the higher levels, with the exception of a few horse-shoes near the surface. Evidences of the use of metal tools are, I think, to be found in the cutting of several of the antler-tools and bones; notably in the Red-deer skull (Plate II). The principal cuts are too flat and sharp to warrant one imagining that they were made by a stone implement. The cuts are here figured on a larger scale (fig. 17). The cutting marks on the antler tool (fig. 11) also suggests a metal tool and the longitudinal, tapering boring (see fig. 12) appears to have been done to receive the tang of a metal knife or other tool.

There are also saw-cuts on some of the bones that could scarcely have been made with a stone-saw.

Mr. Read, F.S.A., of the British Museum, tells me that he considers such antler-tools as figs. 9, 10 and 11 to belong to the Bronze Age or later.

It must not be supposed that the Fascine system of Lacustrine Dwellings is older than the Pile system because of its simpler and more primitive method. The results of Continental researches show that both systems are distributed throughout the different ages, but that the Fascine system occurs generally in the shallow, mossy lakes. This no doubt accounts for the prevalence of the Fascine system in the British Isles.

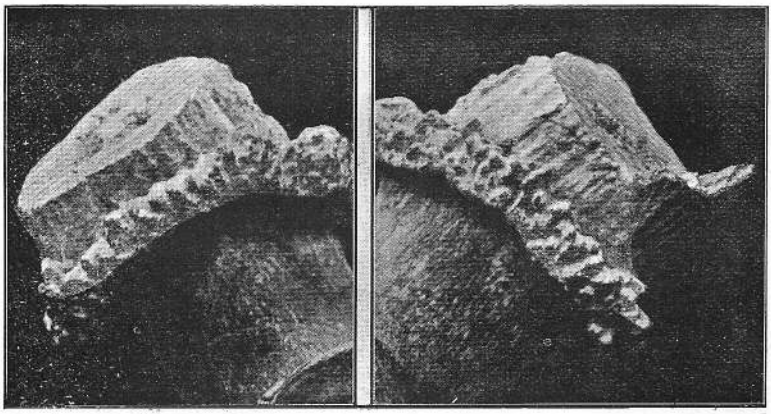


Fig. 17. Photograph of sawn surfaces of Red Deer's Antlers.

Professor Amrein has discovered at Lake Baldegg, a Fascine dwelling constructed on the ruined foundations of a Pile dwelling. See Dr. Keller's *Lake Dwellings*. p 318.

The following note by Messikommer may also be of interest :—

"Man darf mit Bestimmtheit annehmen, dass alle jene Niederlassungen in welchen gespaltenes Eichenholz in grösserer Menge zum Vorschein kommt, auch das Metall in einfacher (Kupfer) oder zusammen-gesetzer Form (Bronze) gekannt haben."

"In those remains where split oak-wood occurs in any great quantity, one may with certainty conclude that bronze or copper was known."

However such speculations are at present, of little use, except perhaps, as being suggestive to those who may in the future undertake the investigation of this locality. What is now wanted is more evidence precisely recorded.

Considering the scientific importance of the subject (one that has unfortunately been much neglected in this country), it is to be hoped that Mr. Kenworthy will have every facility afforded him for continuing his observations, and that members of the Club will come forward to render him assistance in the continuous watching of the Relic Bed, when excavations are recommenced.

Owing to an exaggerated article that appeared in a London daily paper, numerous "curiosity hunters" have been induced to visit the spot, and thereby caused annoyance to the proprietors of the Brick works. But it is possible that upon proper representation from the Club, Messrs. Brown will be induced to look favourably upon the researches, and assist them, while discouraging the mere "curiosity hunter," a class which has done so much injury at Stoke Newington, Ilford, Leyton, and other places having a popular reputation as localites for pre-historic relics.

I should also like to appeal to those who own the numerous objects that have been found before Mr. Kenworthy's appearance on the scene, hoping that they may see their way to place these objects in the collection, which is now, through the generosity and public spirit of Mr. Kenworthy, in the Club's Museum, or at least that they will lend them to the Club, in order that a record of them may be made. Mr. Kenworthy or Mr. W. Cole will be very glad to receive any objects forwarded to them for preservation with the other portions of the collection.

NOTES ON THE GEOLOGY OF THE BRAINTREE DISTRICT, BEARING UPON THE SECTIONS SEEN THERE ON MAY 31st, 1899.

By T. V. HOLMES, F.G.S.

My object in these remarks is to note the features in the geology of the Braintree district, bearing upon the sections shown to Mr. Cole, Mr. Reader, and myself, by the Rev. J. W. Kenworthy, as well as the chief points of interest in the sections themselves. The general geological structure of the country within a radius of six or seven miles around Braintree is very

simple. The lowest formation visible anywhere is the London Clay, which appears here and there in the river-valleys. Above the London Clay, and chiefly in the river-valleys, may be seen the sand and gravel of the Glacial Period. Above this sand and gravel, and forming the surface of the plateau between the valleys, is the Chalky Boulder Clay. Then, here and there on the plateau, are patches of gravel and loam resting upon the Chalky Boulder Clay, and usually occupying slight depressions on its surface. These last-named deposits (which are post-Glacial in the sense of being of later date than the Boulder Clay) are extremely irregular in their occurrence and in the space they occupy. They have sometimes been found to contain mammalian remains of interest, as in the brickyard at Great Yeldham, of which some account is given in the ESSEX NATURALIST (vol. ix., pp. 115--118). All the beds hitherto mentioned are widely distributed, for though the lower are seldom visible, except in the river-valleys, they are found over considerable areas of country beneath the higher beds. In addition, there are deposits which are wholly confined to the river-valleys, having been formed by the streams at various periods during the erosion of their valleys. These are all of later date than the others mentioned, the most recent being the alluvium occupying the flat ground close to the streams. No older river deposits, formed when the river had not cut down its channel to the present level, are shown on the Geological Survey Map as manifestly existing within three or four miles of Braintree. For the older the terrace, the longer the time since its formation during which it has been subject to destructive influences, whether those resulting from the meandering of the stream or from the ordinary action of the weather. Then, while fragments of terraces cut in comparatively hard rock often remain clear and distinct, those cut in soft material, like London Clay or Glacial Gravel, soon cease to be traceable; and the difficulty of identifying them is at its highest in narrow valleys like those around Braintree, where any river terrace can never have been more than a few yards in breadth, and where, consequently, its distinctively terrace-like aspect can never have been very conspicuous. However, the obscurity that prevents any beds of this kind from being mapped at Braintree by no means implies that they do not exist there. In the *Geological Survey Memoir on Sheet 47*† (which includes Braintree, Cog-

† *The Geology of the N.W. part of Essex and the N.E. part of Herts., with parts of Cambridgeshire and Suffolk.* By W. Whitaker, W. H. Penning, W. H. Dalton, and F. J. Bennett. London, 1878.

geshall, and Witham towards its south-eastern border), the following remarks occur (p. 65) :—

"The Valley loams and gravels are not extensive, and it is probable that some of the deposits that are really more recent have been included in the mapping with the Glacial gravels, which occupy most of the valleys, and from which they cannot readily be separated."

These preliminary remarks will render those which follow more intelligible. The sections shown us by Mr. Kenworthy

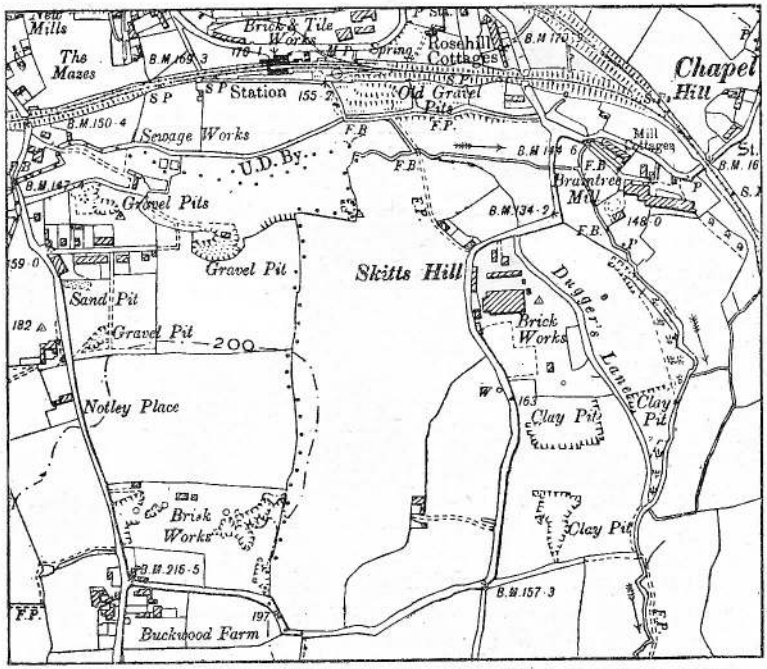


FIG. 18. Portion of 6 inch Ordnance Map of the district around Braintree.

were (with one slight exception) all south of the railway, west of the road from Hoppit Bridge to Buckwood Farm, north of that from Buckwood Farm eastward to the river Brain, and west of the Brain northward to Braintree Mill. On leaving Braintree Railway Station, we crossed the railway a few yards east of it, and looked at the "Old Gravel Pits," shown on the Ordnance Map (Fig. 18), a few yards south-east of the station, and between the railway and the mill stream. The contour of the ground around these pits to some extent suggested the view that they were in old river gravel, rather than

gravel of Glacial age, though there was not evidence enough to have warranted their separation from the latter on the Geological Map. Crossing the Mill stream and the alluvial flat of the Brain southward of it, we then inspected the "Gravel Pit" on the southern slope of the valley, nearly due south of Braintree Railway Station. From this pit we passed to the others south-west of it, where "Sand Pit" and "Gravel Pit" appear on the map, east of the road from Hoppit Bridge to Black Notley. The material in all these pits appeared to be of Glacial age; but in the "Brick Works," in the angle between the Black Notley road and that ranging eastward from Buckwood Farm, there was a patch of loam overlying the Glacial deposits, the junction being shown as in the section here given; height, about 8 feet. Fig. 19.

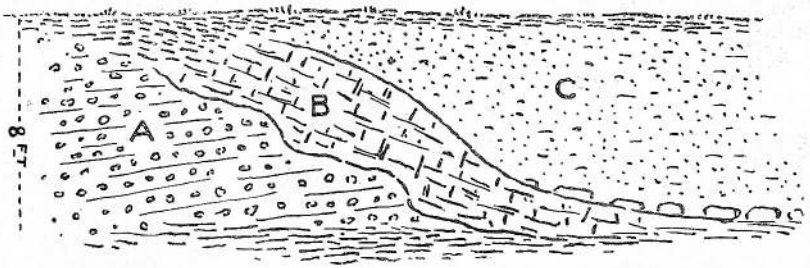


FIG. 19. Section in Pit in Brickworks near Braintree. A, Glacial Gravel; B, Boulder Clay; C, Post-Glacial Loam.

Patches of Post-Glacial loam are shown here and there, in the neighbourhood of Braintree, on the Geological Map, but none appears to have been known at the above spot when the map was published; it is probably to be found at many places where it is not yet mapped, for there is usually no surface indication to suggest its presence, and its existence becomes known through its accidental discovery in a gravel or brick pit. The above section was clear only to the extent shown. The thin strip of Boulder Clay (B) was decalcified, but there can be no doubt as to its real nature. Some large stones were seen on the line of junction between the Boulder Clay and the loam. I have already mentioned the discovery of Mammalian remains in post-Glacial loam at Great Yeldham.

From Buckwood Farm we proceeded along the road ranging thence in an easterly direction, and entered the field south of

the Skitts Hill Brick Works, in which the words "Clay Pit" appear twice. In this field the nature of the material, the shape of the ground, and the appearance of London Clay at intervals along the slope, suggested that its surface was mainly occupied by terraces of old river deposits. Then, crossing Duggers' Lane, we came to the excavations in the alluvium—the most recent of the river-deposits. To a distance of some twenty or thirty yards from the river Brain the alluvium on its western bank had been carted away to a depth of 6 or 7 feet, the original surface of the flat being shown by its level on the eastern bank of the stream. The alluvial flat of the Brain hereabouts is of no great breadth, and there are no signs of the former existence of a lake; but primitive "Moated Granges" may often have been constructed on an alluvial marsh with the aid of piles, and by the formation of an additional short channel, which would allow the habitations to be surrounded by water.

Of Mr. Kenworthy's discoveries in this alluvial flat there is no need to say anything here. It may, however, be useful to add, for the sake of comparison, the following brief account of some excavations in the alluvium of the river Cam, between Audley End and Saffron Walden, quoted in the *Geological Survey Memoir on Sheet 47* (pp. 72--73). The original account was given by the late G. E. Roberts, in the *Anthropological Review*, vol ii., pp. 41--43 (1864).

"In the course of railway works between Audley End and Saffron Walden, it became necessary to divert the course of the river Cam into a part of the meadow land bounding the stream, which was traditionally known as 'the old river bed.' A cutting, about 20 feet deep, through this, necessitated for the foundation of a wide and large culvert to give passage to the river through the railway embankment, disclosed the following section :—

Soil		1 foot.
Alluvium	Clay	3 feet.
	Peat. Bones at the bottom	12 ,,
Gravel		

Near the bottom of this "peat," and at a depth from the surface of 16 ft., an astonishing quantity of Mammalian bones were found. . . . Out of the excavation—an area of not more than 20 ft. by 60 ft. - two cartloads of "large bones" were taken away.

The peat is, more properly, a blackish clay, with numerous fragments of wood and a few logs of considerable size bedded in it. It is everywhere full of fluviatile shells, of species common in the district, and contains many naturally-formed chips and flakes of flint and a few rolled pebbles.

The bones, which bear artificially-made markings,* are the lower jaws o a small ox, probably *Bos longifrons*.

A single tooth of badger (?) was found at the same level in the cutting.

A remarkably fine horn of the great elk, *Cervus megaceros*, was also found in association with these bones."

And, as sections in alluvium are rare, it may be well to add, from the same Memoir, p. 73 :—

"Mr. Dalton notes that where the Rivenhall Brook passes under the railway N.E. of Witham the alluvium consists in part of alternate beds of peat and calcareous tufa, full of shells; and that similar tufaceous deposits occur in the neighbourhood at swampy spots on the shell-marl and on Boulder Clay."

Geological Sections in soft sands, gravels, and clays, like those which cover almost the whole of Essex, are liable to become almost valueless in the course of a few months, or even weeks. We may well, therefore, congratulate ourselves on the presence at Braintree of so keen and constant an observer as Mr. Kenworthy.

NOTE.

My omission to mention the "Westleton Beds" as existing in the neighbourhood of Braintree may, perhaps, be noticed. My object has been simply to avoid confusion. The beds already touched upon comprise all those manifestly existing in the district. It is possible that, had we much more geological evidence than is at present available, we might class some of the sand and gravel, now mapped as Glacial, with the somewhat older Westleton Beds. But looking at the great variability, in this and other parts of Essex, of what has always been classed as Glacial gravel, it appears to me that the evidence now existing would not warrant any division between Glacial gravel and Westleton Beds about Braintree, as a matter of evident fact, even if we concede the probable truth of Sir Joseph Prestwich's general view.

Those interested in the Westleton Beds and their distribution are referred to Sir Joseph Prestwich's paper on the subject, *Quart. Journ. Geol. Soc.*, vol lxvi., pp. 84--181 (1890). A short review of the above paper by the present writer appears in the ESSEX NATURALIST, vol. iv., p. 100 (1890).

* "Made by implements of flint."

THE OCCURRENCE IN ESSEX OF A SPECIES OF WOODLOUSE (ISOPODA) NEW TO BRITAIN (*PORCELLIO RATZBURGI*, BRANDT.)

By WILFRED MARK WEBB, F.L.S.

[*Read December 16th, 1899.*]

HAVING dealt in the Essex Naturalist with the Land and Freshwater Shells of the county in some detail, there seemed to be no likelihood of my making any contribution of importance to the Club upon that subject for some time to come. I, therefore, at our worthy Secretary's request, turned my attention to the collection of Centipedes and Millipedes, classes in which I had already taken a considerable amount of interest. At the same time it was by no means difficult to secure land Isopods, and it seemed as if the study of our Essex Woodlice might produce an addition to our knowledge of the county fauna, with less labour, owing to the smaller number of species.

Being doubtful of some of my determinations, I submitted a number of Isopods to the Rev. Canon Norman, M.A., F.R.S., who had kindly offered me his assistance. The result was that a specimen of *Porcellio* was considered by that authority to be *Porcellio ratzburgi*, Brandt, but its antennæ being damaged it could not be absolutely determined. Other examples from another locality were too young to make quite sure of, but the species is one, said Canon Norman, that there is reason to think might be found in England. Subsequently I have been through my material from Warley and Brightlingsea, and have picked out two additional specimens from the former locality, after careful examination of the supposed *Porcellio ratzburgi*. Canon Norman now tells me that they belong to that species, which has not hitherto been recorded from this country, and I had the pleasure of exhibiting the two woodlice at the meeting of the Club at the Geological Museum, on December 16th. The locality is Warley, and possibly also the species occurs at Brightlingsea, though only immature examples, if any, are in my collection from the latter place. It has been found in Norway, Germany, and France.

[Owing to the interest of this observation of Mr. Webb's, it seems desirable to publish his note here, somewhat in advance of order of date.—Ed.]

THE ESSEX FIELD CLUB.

GARDEN PARTY AT "KNIGHTON."

SATURDAY, APRIL 22ND, 1899.

THE Summer Session of the Club began with a very enjoyable Garden Party, kindly given by Mr. and Mrs. E. N. Buxton at their beautifu grounds, "Knighton," Buckhurst Hill. A large body of members was met at the Station by the Secretary, and conducted through Lords' Bushes to the private gate at the north side of the grounds. Many came from other parts, and in all about 70 members and visitors accepted our kind hosts' invitation. The members were met on the lawn by Mr. and Mrs. Buxton. One of the most charming sights in the spring in the grounds is the fine collection of Daffodils, for which "Knighton" is almost as celebrated as for the Rhododendrons later in the year. The great merit of the garden is that it is truly a "garden wild," intermixed with woodland, and a perfect paradise for birds. No shooting or trapping is allowed, and the numerous "nesting-boxes" placed in quiet corners testified to the care taken in protecting and encouraging the dwellers in the woods and thickets.

The afternoon was spent in conversation, in the delights of croquet, boating on the pretty lake, fringed with all kinds of aquatic plants, or in examining Mr. Buxton's magnificent collection of the heads of large game, and antlers of the Cervidæ, with which the central hall of the mansion is ornamented. They are all trophies of Mr. Buxton's skill as a hunter, during his sporting tours in various parts of Europe. His two volumes, "Short Stalks," and "More Short Stalks," give the history of many of these fine specimens, which are not only of interest to the naturalist, but are in themselves admirable examples of the taxidermist's art.

Afternoon tea and other refreshments were served in the hall and dining room.

During the afternoon an ORDINARY MEETING of the Club (the 187th) was held in the Drawing Room, Mr. D. Howard, President, in the chair.

On the motion of the President, a very hearty vote of thanks was passed to Mr. and Mrs. Buxton for their hospitable kindness in arranging the meeting.

The following were elected Members of the Club:—Mr. Harry Bird, C.C., Miss Amy M. Horton, Mr. Russell Paterson, and Mr. G. T. Reid.

Dr. H. C. Sorby, F.R.S., exhibited a series of specimens showing the advances he had recently made in the methods of preparing Marine Animals for Museum exhibition. The Doctor made some remarks on these methods. He had found that menthol was an excellent agent for "fixing" and killing many organisms in life-like positions, and he had recently employed dense glycerine as a permanent preservative. We hope to be enabled to publish details in the ESSEX NATURALIST at an early date.

To quote the words of the *County Chronicle*:—"Fortunately April was kind, and, in spite of a somewhat threatening dulness during the early part of the afternoon, the sun came out of his hiding-place about four o'clock, and shone with a genial warmth until the party broke up, each member returning home with a sense of gratitude to the host and hostess for having shown them in so hospitable a manner one of the most charming spots in Essex."

WOODLAND RAMBLE AND VISIT TO YARDLEY HILL, EPPING FOREST.

SATURDAY, JUNE 10TH, 1899.

This meeting represented our usual Spring Forest Ramble, the late unseasonable and inclement weather having led to its postponement.

The party met at Loughton Station about 3 o'clock, and walked across the Forest by Strawberry (? Starberry) Hill ponds, High Beach, and Hill Wood (near which the site of Fairmead Lodge, recently demolished, was pointed out (see vol. x., p. 296, and *ante* p. 56). On the way, the refreshing "leafiness" of the forest trees was much commented upon. The cold weather in May appeared to have been very unfavourable to the larvæ of *Cheimatobia* and *Hybernia*, of which there were few this spring — a great contrast with some recent years, in which they were so numerous and their ravages so enormous that many trees were almost stripped bare by the beginning of June. It was evident that this year all the trees would make wood abundantly. Meanwhile the forest was looking its loveliest; all the greens were bright and fresh.

Crossing part of the "mead," the road up Leppits Hill was taken, and a little beyond the "Owl" (well-known to London entomologists) the party turned into a most pleasant sloping meadow, crowded with flowers, amongst which the great quantity of the pretty Umbellifer, the Burnet Saxifrage *(Pimpinella saxifraga)*, specially attracted attention. The footpath running along the edge of the ridge afforded capital views, extending to St. Paul's Cathedral, and—in clear days—to the Crystal Palace. The latter was not visible on the day of the meeting, and St. Paul's shone out only for a short time, because, although the day was fine and delightful for a country ramble, there was a haze in the distance. A pleasant walk by Gillwell Farm, through Gillwell Lane, led to Yardley Hill, a timbered ridge which projects into the Lea Valley. It is the latest gift of our Vice-President, Mr. E. N. Buxton, J.P., Verderer, and was formally dedicated as part of the Forest by the Duke of Connaught, Ranger, on June 1st, and details of this splendid addition are given in another article in the present part (*ante* p. 78).

Tea was served in a tent erected on the summit of a hill, by kind permission of Mr. F. F. McKenzie, the Superintendent of the Forest, allowing of most varied and extended views over the wide Lea Valley and the surrounding woodlands. The spot was that on which the ceremony of dedication of the hill was performed on the 1st of June.

After tea the President, Mr. Howard, said that absence from England prevented Mr. Buxton from being present with them that day. They had had a good opportunity of appreciating the beauty and value of Mr. Buxton's most welcome addition to the Forest, and he proposed that the Club should pass a very hearty vote of thanks to Mr. Buxton for his generosity and public spirit, so often shown for the welfare of the Forest. This vote was passed by acclamation.

Mr. Cole called attention to the special Report on Queen Elizabeth's Lodge, and the Club's Museum there, which had been recently presented to the Court of Common Council of the City of London by the Epping Forest

Committee, and which report had been unanimously agreed to, and ordered to be acted upon. The Lodge would be thoroughly restored, and much greater space given to the Museum. (See Abstract of the Report, *ante* pp. 31-34.)

On the slope of the hill, overlooking the Lea Valley, Mr. T. V. Holmes, F.G.S., gave a short lecture on the physical geography of this fine broad expanse of alluvial soil.[1]

A ramble through Bury Wood and over Chingford Plain took the party to Queen Elizabeth's Lodge, where the Epping Forest Museum was inspected with interest.

THIRD VOYAGE ON THE LEA FROM HERTFORD TO WALTHAM ABBEY.

THURSDAY, JUNE 15TH, 1899.

Conductors :—Major Lamorock Flower, F. San. I.; Mark Davies, Esq. (Gresham Angling Society); T. V. Holmes, Esq., F.G.S.; W. M. Webb, Esq., F.L.S., and the Hon. Secretaries.

By the continued courtesy of the Lee Conservancy Board and the abundant kindness of our Member, Major Flower, the Club was enabled, under exceptionally favourable circumstances, to repeat the charming water excursion which had been found so enjoyable on two previous occasions.[2] The arrangements were similar; the greater number of voyagers went down to Hertford by the 9.30 train from London; others went overnight or cycled down, and a break started in good time from Buckhurst Hill to meet an early train from Waltham Cross, for the convenience of the Forest-dwelling members, and to carry the materials for the tea on board.

After a brief inspection of the ancient town, and the Castle, mentioned in a former report, the party embarked on board the "Salisbury" from the towing path near the road from the railway station, steam was turned on, and the voyage began.

Major Flower is one of the best authorities on the Lea, and was an enthusiastic describer of its usefulness and the quiet pastoral beauties of the bordering water-meadows. Mr. Corble, the Clerk to the Lee Conservancy Board, with thoughtful kindness, sent an ample supply of reprinted copies of a paper by Mr. E. A. H. Bramley, entitled "Walton's Favourite River," which had been read before the Gresham Angling Society on July 19th, 1898, for distribution amongst the members of the party. This little book pleasantly gave much information to strangers to the Lea, and as the present compiler has somewhat fully described the river in the reports already published, he will gladly quote some passages. Mr. Bramley is picturing a voyage similar to our own, and begins :—

1 See his Paper on "The Geology of the Lea Valley," ESSEX NATURALIST, vol. viii., 198.

2 The previous voyages on the Lea under Major Flower's superintendence were held on July 14th, 1894 ("Down River Lea from Hertford to Tottenham," ESSEX NATURALIST, vol. viii., pp 205-213); on July 29th, 1895 ("Voyage from Bromley to Waltham Abbey," ESSEX NATURALIST, vol. ix., pp. 87-99); June 27th, 1896 ("Second Voyage from Hertford to Waltham Abbey," ESSEX NATURALIST, vol. ix., pp. 208-213).

"We arrive by train at the neat little town of Hertford. Before commencing our voyage from this, the beginning of the navigable part of the river, we take an object-lesson from our host, who is guide, philosopher, and friend. We take an imaginary stand in a balloon, and gaze down on a watershed, whence the congealed dews of heaven are drained over an area of 600 square miles. The watershed may be likened to a crooked trough, the bottom of which is the River Lea, stretching sinuously for about 70 miles, and drawing water from the tributaries and slopes on either side, and the tilt of which, from source to mouth, is about 400 feet. Our bird's-eye view stretches into four counties—those of Bedford, Hertford, Essex, and Middlesex. For navigable purposes Hertford is the dividing line, the part from the source to Hertford being usually described as the Upper Lea, and from Hertford to the Thames as the Lower Lea. On the upper part we see a few pleasure boats; on the lower part, numerous barges bearing timber, gunpowder (from the works round and about Enfield), malt from Hertford, Ware, Hoddesdon, &c. The navigation is much busier than the uninitiated imagine. The traffic down the Lea does not merely touch the Thames; there is a junction of the Regent's Canal at the lower part, along which barges travel, and thence along the Grand Junction Canal to Birmingham.

"We gaze down on this picture map, and see a dozen tributary streams lacing and braiding the slopes, pouring their liquid wealth into the Lea, appearing like so many ribs joining the spine. But only three of these are visible in the first 40 miles, and they are just above Hertford, so that the river is comparatively narrow in its upper part. We notice a silver-like sheen in the side streams down as far as Hoddesdon, then a little yellow tinge in a few tributaries, towards the lower reaches a more sombre hue. Why is this? Simply because the bed of the upper stream (with the beds of tributaries) and part of the lower stream, is of chalk. The Ash, which joins the left bank near Hoddesdon, has a soil of gravel and chalk; and some of the lower tributaries come over clay and even mud. Fielde's Weir is taken as the dividing line for geological purposes. There the unadulterated chalk ends; and the purity of the water, and essentially the higher quality of the fish, commence to change. This accounts for the dingy and gloomy shade of the Lea, which has fallen into bad company, as it enters London proper.

"The Lea rises in the form of a spring at Leagrave (formerly Leagrove), a grove in which the river is born. This is in Bedfordshire, about three miles north-west of the town now designated Luton, which takes its name from the river. It was once known as Luyton; the letter "y" has since dropped out, and the name remains as Luton, meaning the town on the Luy. The stream travels nearly to Hertford, about 40 miles, with no accession of consequence other than soakage from the banks. After passing Hatfield, and almost reaching Hertford, it is joined by Bayford Brook on the right bank, and two pretty trout streams (the Mimram and the Beane) on the left. And here we bid adieu to the Upper Lea.

"Heave O! 'The anchor's weighed,' We are nearly 30 miles (by water) from London; our homely barge steams gently on, and we pass Dicker Mill, in sight of some richly-clothed heights, on the left bank, known as Port Hill. History lends enchantment to the place, for here Alfred the Great is said to have fought his last battle with the Danes; and our host produces for our gratification a time-worn, corroded, double-edged sword, with an equally quaint dagger, which had been dredged from the river bed at this part, the

belief being that they were weapons of warfare used in the struggles between Saxon and Dane a thousand years ago. We have passed a lock and two bridges, and gazed joyously on the gambolling roach and dace in the transparent stream, when we reach the Balance-engine, which plays an important part in contributing to the comfort of two-fifths of the population of London. On the right bank we see the birthplace of the New River (at Chadwell Springs), or New River Head, and lower down the Amwell Springs, the channel of which river was dug and fashioned in the reign of James I. to supply the inhabitants of North London with water. For garden-like banks, and purity of water, along a course of about 17 miles' crowfly—and over 40 miles in its windings—this New River is unsurpassed. . . . .

"We are now approaching the town of Ware, and rejoining the river. On the left bank is a mansion, which was formerly a priory established by Benedictine monks; there is also the Priory Mill. Across the old river, where we rejoin it at the end of the cut, the owner of the grounds keeps a bar of wood across the stream as an assertion of private rights against intrusion; but the Conservators, on the occasion of their annual survey, remove this bar, and proceed up the stream as an act of asserted sovereignty, which fact is annually recorded as evidence to be used in case of future litigation.

"And now we come to Ware itself—the old-fashioned town of maltkilns, and all that pertains to the baking of grain and the manufacture of the staple drink of Old England. Along the left bank we have a number of demesnes, each of which has a summer-house overhanging the river. The town occupies both banks, and has a cosy-looking bridge, which constitutes part of the High Street, leading towards Cambridge. Formerly this was the premier town for malting; it is now put in the background by Wakefield and Burton. Prior to the abolition of the malt tax, there were 150 excisemen constantly engaged in the town; but that was when the malt had to be taxed before being brewed, which secured that beer should be made of malt. Now that the tax is imposed on the hogsheads of beer produced, the constituents of the beer are—well, let us draw the veil, and view the town in other respects! The former name of the town was *Guare*, meaning a weare or dam, which was constructed on the river, and strongly fortified by the Danes in 894, as a means of protecting their vessels. The wily Alfred is said to have drained the bed of the Lea near this place, thereby stranding the vessels and enabling him to destroy the fort. The fish are sporting freely at this place, unconcerned about Roman roads, Danes and Saxons, malting, or history; nor are they much startled at the approach of even the Conservancy barge.

"We pass the wharf and crane below Ware Bridge, and come to the Tumbling Bay, where fish are abundant, and whence (or thereabouts) commences a stretch of about two miles (more or less) of fishery, rented by the Amwell Magna Angling Association (who have a handsome clubhouse on the river bank), a veritable dreamland for anglers, the smiling woods on the adjacent heights giving a tone to the scene which gladdens the heart of every man who casts a line.[3] Hard by, the River Ash, close to the road which runs to Buntingford, empties its tolerably clear waters into the River Lea. Here we come upon the pretty village of Amwell, which derives its name from Emma's Well. Amwell Springs yield an extra supply to the New River, as before stated.

3 Some notable anglers' feats by members of this Association are given in the "Notes" column of the present part of the ESSEX NATURALIST.

"Scott (a local Quaker poet) is a name of pious memory. Here is a quotation from one of his poems:—

'Amwell! perpetual be thy stream,
Nor ere thy streams be less;
Thousands who drink thee never dream
Whence flows the boon they bless.'

"Shortly afterwards we come to the smiling village of Stanstead, its banks decorated by pollard willows. The scene reminds us of many that are peculiar to Dutch villages."

Thus far Mr. Bramley. We saw all that he describes, and our day was an ideal one. The sun shone brightly, the air was clear, and the trees probably at their absolute best in this wonderful summer for foliage; birds were numerous, the river was full of fish, which the angling members coveted in vain—for it was the last day of the close season. On the banks bloomed an abundance of wild flowers. These were gathered and examined by the botanical members (including Mr. Arthur Sewell and Mr. Money-Kent). Nothing that was new to the Lea list was observed—the most notable find was the "Gold-of-Pleasure" *(Camelina sativa)*, which occurred on a piece of waste ground on the banks. Of Mr. W. M. Webb's gatherings of Mollusca much the same remark applies—nearly all the species previously noted were found, but no novelties.

Mr. Mark Davies, an experienced Lea angler, very kindly gave us the benefit of some remarks on the Lea from a fisherman's point of view. The following notes embody the gist of his observations:—

SOME RANDOM NOTES BY AN OLD ANGLER ON FISHES OF THE LEA.

By MARK DAVIES, *Member of the Gresham Angling Society.*

"In venturing to discourse to the members of the Essex Field Club on the Fishes of the Lea, I cannot but feel there is some presumption on my part, as I am only able to speak as an old London Angler.

The Lea contains almost every fish that is found in the rivers of England.

Trout are numerous in the upper waters, but below Hertford such as are met with, like Thames trout, grow to a large size. Some thirty years ago I saw one that was caught at Carthagena Weir. It must have weighed nearly ten pounds; it was in beautiful condition, but most unlike the true *Salmo fario*, having no visible spots, and resembled a salmon in appearance. I described this fish to my dear old friend, Dr. John Brunton, who told me that he had once seen a similar fish from the Lea. It was his opinion that they were distinct from ordinary trout—he called them "landlocked salmon." It has been stated by Prof. Rasch, of the Christiana University, in a pamphlet he wrote in 1857, "that salmon grow, thrive and breed without ever visiting the sea."

The trout, no doubt, greatly alters in size and appearance according to the condition of water and food; this is well illustrated by the manner in which the New Zealand trout have grown into the size they have in a few years.

The *Pike*. A Lea Pike is a beautiful fish, and there are no handsomer anywhere excepting the pike from the Avon, although there may be many much larger. The Gresham Angling Society have in their museum a very fine pike that was taken a few years ago at Dobbs Weir—it weighed 26¾lbs. This is considered a large fish for the Lea.

Walton says that Sir Francis Bacon observed the pike to be the longest lived of any fresh-water fish, and it is perhaps the most ferocious inhabitant of our rivers. It has a cruel look, reminding one of the shark. When fishing the reservoir at Chesthunt a friend of mine hooked a pike and had almost secured it, when another enormous pike seized the first fish and made off with it into the weeds, and in spite of the angler's efforts the line eventually broke. My friend some days after got the fish he first hooked, in a very swollen state with some of the tackle still in it.

Perch. My first Perch was taken when I was quite a young boy at the Lock by King's Weir; it weighed nearly one pound. and I can vividly re-call the pride and pleasure had in the capture. I am here reminded of the many happy days of my youth spent at Broxbourne. The fishing inn, the "Crown," was then kept by old Tom Want and his brother. An old writer on Fishing, F. March (my copy is dated 1842), says of the "Crown":—"I cannot pass this house without calling and giving the old toast, 'May you never know *want* but by name'—but here there are two Wants, and the more you know of them the better you like them." The house was in those days what Walton called "an honest ale-house, where the sheets smelled of lavender," and the gardens were charming, although not quite so grand as Benningfield afterwards made them.

The *Chub*. Sometimes called by Lea anglers "Large-headed Dace"—certainly when young the resemblance is somewhat close. My father was quite an adept in catching this fish in the style so delightfully described in the *Compleat Angler*. The sedgy banks of the Lea, with the overhanging old pollard willows and deep holes under the banks, are well adapted to this kind of fishing.

The *Dace* of the Lea is a fine lively looking fish, and is taken up to a pound in weight. Twelve to fourteen ounces are very good fish. Those in the neighbourhood of Hertford, and taken with an artificial fly, afford excellent sport, and require a keen sight and quick hand in securing them.

The *Roach*. "Oh! he is only a roach-fisher" is often used as a term of depreciation. But in reality among many ardent anglers the sport is looked upon next to trout fishing, and certainly among the London fraternity it is thought so much of that during the whole of the season they follow no other—preferring it to every other kind of fishing. In one part of the water at Rye House are still found Roach with black spots. Salter mentions them, and Wheldon says: "At Black Pool, Roach are still taken with black transparent spots upon them; at the bottom of the hole there is a black peaty bog—the spots may arise from this." The extraordinary fact is that although there are other parts of the water of greater depth, the spotted fish are only caught in this hole.

The *Carp* is sometimes taken in the Lea. Possibly being a native of still waters, they are carried by floods or the breaking down of sluices (as are Tench and Rudd) into the river; they then grow finer and fatter, but, it is said, they do not breed.

To the *Tench* much the same remarks apply, but there is a better chance of catching Tench than Carp, as the former are not equally cunning.

Barbel. This fish grows to a large size in the Lea. I have seen great numbers of them below Kings Weir and at Sewardstone some years ago, but they are seldom taken by anglers. Bayley, the proprietor of the waters at the latter place, told me that the celebrated Bayley of Nottingham came to see what he could do there, but he had no success with the Barbel.

The *Gudgeon* was a great favourite with London anglers. It is a bold fish, and greatly esteemed for the table. At one time they were very numerous in some parts of the Lea. Bets have been made to take sixty gudgeon in an hour, a feat often accomplished.

The *Bleak* (called by Walton "the fresh-water sprat") is abundant in the Lea. Like Roach and Dace they are gregarious, swimming in shoals, and taking flies on the surface.

The *Loach*, *Stickleback* and *Minnow* are met with in great quantities.

The *Bream* and the *Ruff* (or Pope) are not uncommon in the Lea.

The *Eel* occurs in good numbers, and of splendid quality for the table.

Stone Loach very plentiful, and *Bullhead* not uncommon.

The *Grayling*. Attempts have been made to introduce this fish into the Lea. I have read that in the summer of 1864 as many as 1,500 Grayling were turned into the river at Brayfordbury Park, but the fish has not been much reported since as having been hooked by any of the Lea Anglers."

A cordial vote of thanks was passed to Mr. Davies, both for his paper and for the information imparted during the excursion.

We now pass the smiling village of Stanstead, with the banks decorated by pollard willows, the neighbouring gardens being very Dutch-like and quaint. Before reaching Rye House, the appointed mid-day resting place, one member, Mr. Benjamin Winstone, who is on board, afforded the party an opportunity of acquiring some information on the history and construction of that historic building. Mr. Cole read for him some extracts from a paper prepared for a visit of the Leland Society some years ago, but which was not read on that occasion for want of time. The paper was entitled :—

RYE HOUSE, 1685.

By BENJAMIN WINSTONE, M.D., F.C.S., &c.

"Rye House is well known as a place of entertainment for school children and others, who resort to it for recreation in large numbers during the summer. It has, in addition to its pleasure grounds, a fine Tudor Gate-house, the remains of the ancient Manor House; and it possesses moreover an historical interest from its association with the well-known plot, to which it gave the name; a conspiracy having for its object the assassination of Charles the Second and his brother the Duke of York on their return from Newmarket; as the commencement of a general rebellion throughout the kingdom."

After some general observations on the historical authenticity of the conspiracy, and quoting opinions from various authors, Mr. Winstone proceeds :—

"The plot to revolutionize the kingdom, which was to have had its commencement in the assassination of the king and his brother entirely failed.

It has, however, given to the Rye House an historical interest, greatly increased by the arrangement of the grounds at the present time. For although the old buildings, with the exception of the Gate-house, no longer remain, new buildings have been erected, occupying, to a great extent, the sites of the old ones; so that the general appearance now is much the same as is shown in the plan of 1685. The buildings were, at that time, described as being very old, and as they were built at the end of the reign of Henry VII., or beginning of that of Henry VIII., they had been standing more than 160 years, and no doubt had the appearance of being very old, when the account of the plot was drawn up. It is stated by Sir Henry Chauncy, in his History of Hertfordshire, that Henry VI. granted a licence to Andrew Ogard and others, permitting them to impark the site of the Manor of Rye, otherwise called the Isle of Rye, in Stanstead Abbots, and to erect a castle there with lime and stone, and to make battlements and loopholes. The time intervening between the grant to Andrew Ogard, and the reign of Henry VII., comprised the period of the wars of the Houses of York and Lancaster, in which landed proprietors were much involved. It is therefore not unlikely that no opportunity arose for erecting a castle, such as the grant permitted, and that, as the county at the end of the reign of Henry VII. had become so much settled, there was no necessity for erecting a stronger building than that shown in the plan (1685). The gateway, unlike so many other buildings of the same period, is in a good state of repair.[4] In one corner of the room over it is a staircase, shown in the plan as leading to the inner court-yard, but the lower portion has been altered within the last few years. It passes by a vault, reported to have been the dungeon; and bones are shown, said to have been found in it. There arises a doubt whether the manor had any jurisdiction for which a dungeon would be required. The age was, however, very lawless, and for many generations after life was held to be of little value; so that there is a probability of some obnoxious persons having been secretly murdered and buried in the vault. The informer Keeling's companions had designed for him such a fate. The circumstances are mentioned in the account of the 'horrid conspiracy' as follows:—

> 'John Keeling, one of the conspirators, who, with his brother had given information to Mr. Secretary Jenkins, having let fall some expressions, which, being rumoured about, came quickly to the knowledge of some of the conspirators. Upon this they immediately assembled, and Rumbald declared his fears of Keeling's treachery, and that were he sure of it, he would instantly knock him on the head. Keeling, however, for a time, allayed their suspicion. But the distrust continuing, it was mentioned to Keeling, and he was advised to withdraw for a time out of town, Rumbald offering his house to retire to.'

"Keeling, however, declined the invitation, giving as a reason for doing so, urgent business and family affairs, so that—it is stated

> 'For that time he got safe out of their hands, which they afterwards extremely regretted; some of them owning, that it was their purpose, if they could have got him abroad, to have killed and privately buried him.'

4 Over the archway are figures, representing on one side two birds, and on the other a dragon about to take hold of a man's hand; on the same side are two supporters holding something, which is much weathered, so that the design cannot very well be made out.

"Behind the gatehouse are large reception rooms, occupying the same position as the old buildings, and probably erected for the most part on the old foundations. The moat, formerly surrounding the manor house and garden, now also surrounds the garden and buildings. It is, however, narrowed to a ditch in front of the gatehouse; and a little bridge spans it, where once, no doubt, there was a drawbridge, for at the top of the gateway on both sides are holes, as if for the chains by which the drawbridge could be drawn up when safety required. The outer court-yard, separated from the dwelling house and garden by the moat (in which the horsemen and other armed men were to have assembled, and been concealed to await the approach of the royal party), exists as a bowling green, and is bounded on one side by a long low building, occupying the place of the malt house. The granary, the loop-holed wall, and the towers at the corner of the moat have been removed. The grant to Andrew Ogard comprised 50 acres of land —eleven acres of meadow, eight acres of pasture, sixteen acres of wood; which are now no doubt the fields surrounding the premises. The boundaries are not marked in the plan, but a toll gate is mentioned 250 paces from the outer court-yard fence, and apparently occupying the same position as the gate which now separates the premises from the meadows. In the account of Rye House (1685), it is stated, in coming from Newmarket towards London, 'when you are near the House,' you pass the meadows over a narrow causeway, at the end of which is a toll gate, which having entered you go through a yard, and a little field. A traveller from Newmarket by Stanstead to Hoddesdon, passes now as he did in the time of Charles II., over the narrow causeway through the meadow, and has to pay toll at the gate. Then he passes through the yard, and through the little field, and enters the narrow lane in which the cart was to have been overturned.

"Old halls of much more architectural importance, and of an earlier date are known. Netherhall was an earlier and a nobler building than Rye House. Most of them, however, are in ruins, consisting only of detached portions of the walls and the plans of the buildings can only be made out by tracing, where they exist, the foundations of the other portions. But Rye House has the original arrangement of the buildings and premises so well maintained, that there is no difficulty in following the plan of the premises in 1685, and also the plan of the conspirators. It has, therefore, much to render it an object of great interest to all those who derive pleasure from an examination of places and localities which have been rendered important by their historical associations."

Mr. Winstone exhibited copies of the Plan of 1685, which he had re-printed. A vote of thanks was heartily given to him for the interesting paper read.

Soon afterwards the "Salisbury" was safely moored at the Rye House, and the party sat down to an excellent luncheon provided by Mr. Teal.

Then followed an ORDINARY MEETING (the 188th), Mr. T. V. Holmes, F.G.S., *Vice-President*, in the chair.

The following were elected members of the Club:—Dr. Alexander Ambrose, B.A., M.D., L.L.D., Mrs. A. Boake, Col. Bryan, C.E., Rev. T.

Huddle, M.A., Mrs. A. Johnson, Miss M. M. Johnson, Mr. D. J. Morgan, J.P., Mr. W. S. Parker, Miss Emily Read, Dr. Albert Wilson, and Miss Berta Wilson.

In the absence of the author, the Secretary read the title and gave a short account of a paper entitled "Essex as a Wine-Producing County," by Mr. Miller Christy, F.L.S. This paper has already been printed in the present volume of the ESSEX NATURALIST (*ante* pp. 34-48).

Some time was spent in rambling about the very attractive grounds of the house. The dungeons were visited and the "museum," the precise information on the rarities therein contained given by the attendant causing much amusement. The most interesting curiosity of the collection is the Great Bed of Ware. It is thus mentioned in Cussan's *History of Hertfordshire* (1870):—

"The 'Great Bed,' mentioned by Shakespeare, and of which everyone has heard, demands a passing notice. It was originally in the 'Crown Inn,' and on the demolition of that building in June, 1765, it was transferred to the 'Bull,' whence it was afterwards removed to the 'Saracen's Head.' It is *said* to be upwards of four hundred years old, but the style of carving does not indicate a period earlier than that of Queen Elizabeth; the date, 1463, painted at the head is comparatively modern. In form it is nearly square, each side being about twelve feet in length; the massive posts are plain at the bottom, and at about two feet from the ground are four pillars, one at each angle of the posts. These pillars support four arches, above which the posts, elaborately carved, continue for about four feet more; the total height being about eight feet. The canopy and the head of the Bed are finely carved; the latter, with human figures, fluted work, heraldic roses, and gothic arches. Its beauty is much marred by initials and names cut by idle sightseers, amongst whom 'Mr. William Harrison, of Saxelby, Lincolnshire a Malitiaman, 1761,' is most conspicuous."

The relic was purchased at the sale at the "Saracen's Head" by Mr. Teale, and added to the curiosities of Rye House. A description of the Bed, with a picture of it, was given in the *Literary World*, of January, 1840.

The remarkable display of the fine yellow "Musk" plant on the banks of the river, after leaving the Rye House again, attracted much attention. This plant has been hitherto recorded in all our Floras and local lists as an alien under the name of *Mimulus luteus*, L. It now appears probable that all the records of it apply to *M. langsdorffii*, Dow (North American). The distinctions between this and other species, previously grouped under the name *M. luteuss* from the true (South American) plant of Linné, were given by Prof. E. L. Green in the *Journal of Botany* for 1895, pp. 4-8. The flower is specially interesting, as Mr. Hepworth remarks in the *Rochester Naturalist*, in possessing a curious bilabiate irritable stigma, which slowly closes when touched. It appears to be rapidly establishing itself in many places in England.

To resume Mr. Bramley's narrative, "a bridge was erected some years ago below the Rye House, in the place of one which had stood from the time of Charles, the timber of the old bridge being black as ebony. This is just above Field's Weir, which is so named from its being constructed by a family named Fielde, the owners of Rye House. Here the river Stort (on

which the malting town of Bishops Stortford stands) enters the Lea. Next comes Dobb's Weir and Tumbling Bay. I have never fished this district, but am tempted to visit the place some day, as it has a most inviting appearance, and hoists a public announcement that anglers may obtain tickets at the neighbouring hostelry—'The Fish and Eels'—on the bank, which we noticed in passing. Next comes Carthagena Bay, the reason for which Spanish cognomen appears to be unknown. Here," Mr. Bramley adds, "I have spent many days with rod and line, and remember a once familiar angler, the late Charles Bradlaugh, M.P., whose name and angling skill will not be forgotten while so many specimens of his sportive success grace the walls of the hostelry just below, viz., the 'Crown' at Broxbourne. A change has come over the 'Crown' so far as ownership is concerned. Change is a law of nature, if law and change do not form an anachronism. Laws are immutable, and, in this respect, mutability is immutable. Anglers have for years known a distinctive figure, Mrs. Benningfield, whom probably they will know no more as hostess of the 'Crown,' for, although still continuing to reside in the neighbourhood, the lady has sold her interests in the house and gardens, and the fishing arrangements.

"King's Weir attracts us, and calls for a halt. We step on the bank and find an old friend and well-known angler drinking in the breezes of this healthful place, and in the closing act of struggling with a 3lb. bream. There are several chub flaunting their bright backs before we leave. The pool here is rented by some half-dozen London anglers, who appear to have in hand what is commonly described as 'a good thing.' Eels are said to abound; chub and bream, too."

On the way Mr. Holmes discourses on some salient points in the geology and geography of the valleys along which we are steaming, and Mr. Webb exhibits the mollusca found, giving some interesting talk on their habits and mode of occurrence. Mr. Webb also exhibited a fine specimen of the very curious "graft-hybrid" *Cytisus laburnum-adami*, which came from Mr. Winstone's garden at Epping. A copious description of this form, so interesting to plant physiologists, will be found in the English translation of Kerner's *Natural History of Plants*, II., 570-1 It will be remembered that a specimen from a garden at Buckhurst Hill was exhibited by Prof. Boulger, at a meeting of the Club on May 24th, 1884 (see *Journal of Proceedings, E.F.C.*, vol. iv., p. *c.*)

A very refreshing tea, with plenty of fruit, was served on board. Very cordial votes of thanks were passed to Major Flower for his kindness so often shown, and also to the Lee Conservance for the use of the boat, and to Mr. Corble for the trouble he had taken in connection with this, our fourth voyage, and we found ourselves approaching Waltham Abbey, the end of the excursion for most of the party. As Mr. Bramley writes:—"These last few miles for quiet sylvan beauty are not the least attractive. In the distance we view groves of trees, behind which are some extensive works for the manufacture of gunpowder, cordite, &c., which stimulate our martial pride in this age of actual wars and rumours of wars. Waltham is noted for its neighbouring old-time convents, its former line of 27 abbots and numerous monks, and the famous Abbey, which has held its own for centuries. Tradition ascribes the first thoughts of the Reformation to have been hatched in the mind of

Henry VIII. when at this place, pursuing his favourite private amusement (please interpret lightly), respecting which latter Fuller, the last Abbot of Waltham, and Church historian, sneeringly refers to the monarch to whom he surrendered his estates, saying, 'Waltham bells told no tales when the king came there.'"

Waltham Abbey was reached a few minutes after 7 o'clock, and there a number of the party went ashore for the train; the remainder continued the journey in the barge to Enfield Lock, where carriages awaited them, and they closed an exceedingly delightful day by driving towards the Forest villages, dropping members at cross roads convenient to their homes. Our chatty author, Mr. Bramley, continued his narrative to include the Lower Lea, which the Club ascended on a previous voyage; and having quoted so largely from his paper, we may allow him to finish the story:—

"Below Waltham, most places on the Lea are familiar in your mouths as household words—Rammey Marsh, Newman s Weir, Enfield Lock, Enefelde (so named from its being situated among fields); Tottenham, one of the places where the corpse of Queen Eleanor rested, and in memory of which a cross was erected.[5] The famous cross of wood, covered with lead, as it existed in the time of our great master—Izaak Walton—and at which he at times rested when journeying to the River Lea in pursuit of his favourite pleasure, is described by him as a 'sweet shady arbour, interwoven of woodbine, sweetbriar, jessamine, and myrtle,' where he used to refresh himself, and drink 'sack, milk, oranges and sugar, which, all put together, make a drink like nectar; indeed, too good for any but us anglers.' Some anglers have enlarged upon this practice, and added other sweets. The river runs on by Clapton, Bow, Hackney, and Stratford (the old river), to discharge, *via* Bow Creek, into the Thames near the Isle of Dogs—so named from the dog kennels of Henry VIII. being placed on that small isle, north of the river opposite the King's palace at Greenwich, from which palace the barking of the dogs was sometimes audible. The other entrance to the Thames is at Limehouse, by the New Cut made in 1767.

"We have traversed a great portion of the stream at those parts which our great master so frequently visited and referred to with so much tenderness. However interesting may be the events connected with past history in relation to this river, there are none which appeal to our hearts with greater force than the fact that Izaak Walton's classic work, *The Compleat Angler*, records in charmingly simple language numerous visits to its waters made by that dear old fellow, who trudged many weary miles to its banks before steam engines or steamboats were known, and when even the means of being helped partly on the road by horse or any kind of vehicle must have been practically non-existent. This is a paper, not on Walton, but on the stream frequented by him. That the prince of anglers, and the greatest of angling authors, should have fished the Lea so persistently, and described it so affectionately in his happy dialogues, has given fame to the stream, and justifies, I submit, the choice of title to this paper—'Walton's Favourite River.'"

5 This is a popular error; Tottenham Cross was one of the wayside crosses once so common in England. See J. E. Harting, "Izaak Walton's Association with the River Lea," in ESSEX NATURALIST, viii., pp. 186-198, where a picture of the Cross is given.

[The publication of several Reports of Meetings is unavoidably deferred until the next part.]

NOTES—ORIGINAL AND SELECTED.

ZOOLOGY.

MAMMALIA.

Otters in Essex.—Dr. Laver remarks in his *Mammals, &c., of Essex* that "this animal is not as uncommon in Essex as in years gone by, when there seemed every probability that the otter would become quite extinct in this county." The increase of otters may be credited, judging from the many references to their occurrence in our volumes for the last eight or ten years. But they are frequently shot or otherwise killed in the most ruthless manner. In March an otter was shot in the saltings near the "Leavingo" at Tollesbury. It was a fine male, measuring 4 feet from the snout to the tip of the tail. A few weeks before a female was shot in the same place. On May 10th another "noble sportsman" of Sible Hedingham, shot three otters, two yonng ones and their mother, in the wash-way of the river there. "The animals were playing in the water when they were observed." Not content with sposmodic slaughter, other "sportsmen" (male and female) must needs establish otter hounds, and we read of a hunt in the Blackwater in April, when one was found at Little Braxted Mill; again at Shalford in September the hounds killed a dog otter weight 22lbs. A few days after one was hunted at Passingford Bridge and lost, but afterwards another was killed weighing 23lbs. If these otter hunts are encouraged, we may soon bid goodbye to *Lutra vulgaris* in Essex. It is difficult to realize what satisfaction can be found in thus deliberately exterminating one of the most interesting denizens of the county. Truly

> "Satan finds some mischief still
> For idle hands to do!"

A White Fox near Billericay.—In the Essex Union country there is at the present time a freak in the shape of a snow-white fox. This is one of a litter of four (the other three being of a normal colour) which were bred in Norsey Wood, an extensive woodland near Billericay. During the summer months the keeper had on three occasions seen this cub in the covert, which was drawn on Oct. 14, for the first time this season. The white cub was soon *en évidence*, and was viewed by several of the field as he crossed the rides. There being no scent, however, nothing could be done Probably you or some of your readers may have heard of other instances of white foxes in England; but the only authentic case I know of is that mentioned by Colonel Meysey-Thompson in his book published last year, in which he narrates how a white fox was hunted and eventually killed by the York and Ainsty Hounds during the late Sir Charles Slingsby's mastership.—E. T. MASHITER, M.F.H., in the *Field*, October 21st, 1899. [The Editor of the *Field* adds that several instances of white foxes in England have been reported from time to time. See the *Zoologist* for 1886, pp. 104 and 331, and 1891, p. 333; and the *Field* of Nov. 5, 1898.

The Porpoise (*Phocæna communis*) in the Thames.—According to the London *Standard*, much interest was excited shortly before 11 o'clock on the morning of September 13th, 1899, among persons passing over Blackfriars

Bridge, at the sight of a large number of porpoises sporting themselves in the Thames close by the bridge. Their antics were most amusing. After remaining for a time in the vicinity of the bridge, they made off in the direction of Westminster. It is an indication of the improving condition of the Thames that this gregarious Cetacean, common enough off the Essex coast, should ascend so far up London's river. The porpoises probably did so in the pursuit of some kinds of fish.

AVES.

Little Owl (*Athene noctua*, **Scopoli**), **at Harlow.**—A specimen of this exceedingly rare bird is reported (in the *Essex County Chronicle* for October 27th, 1899), as having been caught in a rabbit trap at Harlow. It is in the hands of Messrs. Tyler and Ringer, of Bishop Stortford, for preservation. We hope to obtain further details. The bird has only occurred about 20 times in England, and according to Mr. Saunders there is some doubt as to the truly wild nature of at least some of these examples. In Essex, according to Christy (*Birds of Essex*, 161), the only really authentic specimen is that in Mr. G. P. Hope's collection at Havering Grange, found dead in a plantation in Chigwell, in 1865.

The Sea-Gulls on the Thames.—"London's sea-gulls have just returned to town, and the pigeons on the Embankment, near Blackfriars Bridge, are once more turning green with envy. The gulls have nearly all arrived, and yesterday (October 12th), during the dinner hour, the bridge and the Embankment near it were lined with spectators, who threw morsels of food to the welcome birds. The gulls—there were a couple of hundred of them—wheeled about in the air in thorough enjoyment of the fun, and screamed shrilly as they swooped down and carried off the scraps. The game lasted about an hour, and everybody enjoyed it—except the hundred pigeons who live on the Embankment, near Blackfriars Bridge, all the year round. To the pigeons the winter brings feelings of disgust and despair. The gulls turn up in scores and monopolise public attention, and the pigeons vainly endeavour, in their longing for notoriety, to try and look like sea-gulls. They start below the bridge, come flying up at lightning speed, and then, spreading their wings, try and float about in the air like their more buoyant antagonists. But it generally ends in failure. A sudden gust upsets the sailing pigeon's balance, and either flings him perilously near the bridge or sweeps him away up stream."—*Daily Mail*, October 13th, 1899. A note by Mr. Howard Saunders, on the species of Gulls frequenting the Thames during the last three or four years, will be found in the last volume (E. N., vol. x., p. 392). The Gulls are now (November) very much in evidence in the air opposite Somerset House; they may be seen also by dozens resting on the floating barges keenly on the look-out for passing food.—B. G. COLE.

BATRACHIA

Palmated Newt (*Molge palmata*) **at Buckhurst Hill, Essex.**—During a hunt for pond animals in this neighbourhood in June last, I was delighted to find *Molge palmata* somewhat commonly. The merit of first discovering the species in the Forest belongs to Dr. G. A. Boulanger, F.R.S., who found it in a small pit near Chingford Station (see ESSEX NATURALIST vol. I., p. 8). This pretty newt will probably be detected in other parts of

the county, if well looked for; Dr. Laver has found it abundantly in a pond of Donyland Heath. As pointed out in the above quoted note, the absence on pigment on the throat affords a ready means of distinguishing *M. palmata* from *M. vulgaris*, independently of the other and better known characters.—WILLIAM COLE, Buckhurst Hill, Essex.

PISCES.

Blennius gattorugine in Essex.—In the *Zoologist* for June (4th ser., vol. iii., p. 273), Mr. A. Patterson records the capture of this species at Great Yarmouth, for the first time in East Anglian waters. It measured 4in. in length, and the fish "was not at all highly coloured, as depicted by Couch, but was of a dull tawny or yellow-brown, the edges of the fins being of a ruddy hue. Day speaks of it as being subject to variation, according to locality, and, no doubt, on our sandy coast, such a stray fish would assume more sober tints than in its native rocky habitat." At page 326 of the same volume, Mr. E. A. Fitch reports that he has one caught in the Essex Blackwater, off Stansgate, on August 19th, 1898, by Sampson Wright. He adds, "it is typical with Day's figure and description, and measures 5½in. long. I have it preserved in 4 per cent. formalin, and it looks as fresh as when I had it alive." The Editor of the *Zoologist* remarks on the above as follows:—"The Gattorugine, known to fishermen in the West of England by the homely appellation of Tompot (Couch) has been recorded from the north-east coast included in Sir Cuthbert Sharp's List of Hartlepool Fishes;' cf. R. Howse, 'Cat. Fishes of the Rivers and Coast of Northumberland and Durham,' p. 25. It is reported as lying concealed in pools among long seaweeds, where it is probably often overlooked."

Angling in the Lea River half a century ago.—Mr. Francis Howse, Hon. Secretary of the Amwell Magna Fishery, has kindly presented to our library a copy of a pamphlet which he has prepared and printed for private circulation, being a record of notable fish taken in this famous fishery by members and their friends between 1851 and 1871, and based upon a diary kept by the late Robert Brown, the keeper. The fish mentioned are jack, roach, trout, gudgeon, perch, carp, chub, tench, and rudd, the last three very rarely. The Fish Editor of the *Field* has given the following analysis of the record:—"The falling off in late years in the numbers and weight of jack is attributed, to a great extent, to the smaller volume of water in the old Lea River, caused partly by a more efficient system of land drainage, and partly by the large quantity of water drawn off by the Companies. To these causes must also be added the strenuous efforts made to reduce the pike in the New River. It must be also remembered that, during the twenty years under review, there were only fourteen members, and that for some years that number has been increased to twenty-five."

"The large and always specifically handsome trout of the Lea (as they remain to this day) appear in the earliest of the records, not, of course, i quantity, but at fairly frequent intervals. Mr. T. Howse, the well-remembered father of the editor of this memorial, was one of the most successful pike fishers from the fifties onwards. The best season for pike during the twenty years covered by the entries was apparently that of 1860-1, when 95½

brace of jack were taken. The weight of these is not given, but they would probably be of about the same average as the 94½ brace killed in 1856-7—total weight, 406lbs.

"On July 25th, 1861, there is an entry showing that Mr. T. Howse and his sons caught twenty-two brace of perch, four brace of ack, and two dozen gudgeon, in the lower water of the fishery. That must have been a red letter day indeed! The gudgeon have almost entirely disappeared from that part of the Lea (and many another part also), and there is no longer such perch fishing as was enjoyed during the years previous to 1861. Here are entries showing that Mr. T. Howse and son caught nineteen brace of perch, and Mr. Munt and Mr. McRae sixty-one and a half brace; Mr. Robert Wright (one of the old brotherhood who have gone to their rest) and Mr. Charles Briand (who is still an active member of several angling societies) are also entered as captors of a big bag of perch in 1860. There are frequent entries, indeed, showing very excellent perch fishing; Mr. Henry Wix, for example, had, in 1859, twenty perch weighing 16lbs., and seven chub weighing 9lbs., in Amwell Pond; and there are records, one after another, of sixty brace and forty-two brace of perch, eighteen dozen gudgeon, and so on. These, alas, are feats of the past. The common weight of the big trout appears to be 6lb., especially those caught at Ware Mill. The carp is mentioned once, the rudd only twice, and the only record of the tench is that of one of 2lbs. 6oz. in March, 1861, with the note 'the first tench ever known to be taken at the fishery.'"

INSECTA.

Sirex gigas at Loughton.—Our Treasurer, Mr. W. C. Waller, sent up for the Museum a fine female specimen of *Sirex gigas* which has been caught in his garden at Loughton on July 9th, 1899 (see note in last volume (vol. x.) at page 189).

Acidalia rusticata at Shoeburyness, Essex.—I have taken a few specimens of *Acidalia rusticata* this season at Shoeburyness. Is there any early record of the occurrence of this species in Essex? But for my having seen two examples in a small collection formed by a beginner it's more than likely that I should not have captured this insect, as the spot where it occurs is on Government ground from which the public is excluded. The moth seems to be exceedingly local, and it is, therefore, a matter for congratulation that it is so effectually protected.—F. G. WHITTLE, Southend, August, 1899.

Calymnia pyralina and Cucullia asteris near Southend.—At the end of May, a friend was kind enough to allow me to accompany him to a locality some few miles north-west of Southend (I cannot be more precise), where larvæ of *Thecla w-album* and *Calymnia pyralina* might be expected to occur We did not see *T. w-album*, but sundry *Calymnia* larvæ were beaten from which I reared, about the middle of July, three *C. affinis* and three *C. pyralina*. I found yesterday a larvæ of *Cucullia asteris* on a plant of *Aster tripolium* at Great Wakering.—F. G. WHITTLE, Southend, September 18th, 1899.

Glow-worm and Frog.—On the evening of September 2nd as my brother and I were passing along the Epping New Road, near "Kates Cellar," Broom Hill, we saw a glow-worm's tiny lamp shining on a bank by the wayside. As we got off our cycles for a nearer view, the spark suddenly disappeared, and on turning the light of a lantern on to the spot we were just

in time to see a frog hopping away. *Lampyrus notiluca* was not to be found and she was presumably down froggy's gullet! We have not seen the glow-worm in the forest for many years. About 1879-82, they were very common at Buckhurst Hill, but since the latter year not a specimen has been seen by me until that solitary one occurred as above mentioned. I am disposed to attribute the disappearance of this very interesting beetle to the increase of snail-devouring birds. Snails are certainly getting scarcer in the open year by year, and with them diminish the glow-worms which subsist upon the molluscs. I should be glad to know from collectors whether *Lampyrus* is now rare in other places around London, Years ago the males were plentiful enough with us in the Kentish, Surrey and Essex woods, dashing at night against our entomological lanterns, whilst the females often glistened by scores on the grassy banks—a charming and poetical sight.—W. COLE, Buckhurst Hill, November, 1899.

CRUSTACEA.

The "Well-Shrimp" (*Niphargus*) **in East Anglia.**—In connection with the Rev. T. R. R. Stebbing's address at the Conference of Local Scientific Societies at Dover (*ante* p 70), it may be interesting to refer to a paper by Dr. Sidney F. Harmer, F.R.S., in the current part of the *Transactions of the Norfolk and Norwich Naturalists' Society* (vol. vi., p. 489), recording the occurrence of *Niphargus aquilex*, Schiödte, at Cringleford, near Norwich. *Niphargus* is a small Amphipod Crustacean, with rudimentary eyes, and is interesting, Dr. Harmer says, as being a typical member of the Cavernicolous fauna. It can readily be distinguished from *Gammarus pulex*, the common "Freshwater Shrimp," by its colourless, semi-transparent appearance, and by the slenderness of its form. Three species are recognised as British by Spence Bate and Westwood (*History of the British Sessile-eyed Crustacea*, vol. i. (1863), pp. 311--325), viz., *N. kochianus*, *N. fontanus*, and *N. aquilex*. Dr. Harmer gives many details of distribution of members of the genus, and alludes to the very complete summary of the literature of the Amphipoda, including papers on *Niphargus*, given by the Rev. T. R. R. Stebbing, in the *Challenger Reports* (vol. xxix., pt. lxvii., 1888). We hope that some of our observers will search for this interesting Crustacean (together with the well-worm, *Phreoryctes*, *ante*, p. 1), in suitable localities in Essex. It is probably a common form, if well looked for. Mr. Stebbing informs us that an old lady had lately told him that she was familiar with the Well-shrimp at Norwich in her youth. Dr. Harmer suggests that the device employed by Prof. Herdman in the examination of the surface fauna of the ocean (Brit. Ass. Rep., 1897, p. 695), viz., by tying a muslin bag over the taps through which the water may be pumped, or is flowing, may lead to the detection of the shrimp. *Niphargus* has been recorded from several southern English counties, and from many Continental localities.—ED.

MOLLUSCA.

Mollusca in the Old Bed of the Lea River.—The Rev. J. W. Horsley, St. Peter's Rectory, Walworth, has communicated to *Science Gossip* (vol. vi., N.S., 181) some interesting notes on the Mollusca observed in the old bed of the river Lea, near Park Station, Tottenham, during a recent excursion of the Conchological Society. The observations, he remarks, showed what "a

wealth of Molluscan life there existed, and now has been utterly destroyed by the diversion of the stream in the formation of some huge reservoirs for the East London Water Company. In many cases the bed was covered with shells, amongst which were noticed *Succinea elegans*, fine, but decorticated; *Vivipara vivipara*, the green bandless variety by no means rare; *Neritana fluviatilis*, varying much in colour, from a black and white tesselated form to a pretty crimson one; many also were trifasciated. *Valvata piscinalis; Bythinia tentaculata*, and its variety *alba*, and a few specimens showing a pathological (?) white line on the periphery: *Limnæa peregeri; L auricularia*,. *L palustris*, not common, and *L: stagnalis*. Of the last, some were very thin-shelled, and showed marked ribs or striations, and one or two specimens found by me were beautifully banded with white. *Planorbis corneus* was plentiful, but local, and several places were found covered with its shells, which had been eaten, probably, by *Dyticus marginalis* [see *Jour. of Malacology*, vol. vi., 30], by the removal of the whole of one side of the shells, leaving the other perfect. They were collected, after the manner of *H. nemoralis*, round a 'thrush' stone. *Planorbis marginatus, P. carinatus, P. vortex*, and *P. albus*. *Pisidium fontinale* and *P amnicum; Sphærium corneum*, very fine; *S. lacustre* and *S rivicola*, abundant in spots, and fine; *Anodonta cygneus*, and the form called *anatina* of *Unio pictorum*, and *U. tumidus*, the latter of the two far outnumbering the former."

Duration of life of *Helix pomatia*.—It may be interesting to put on record a fact bearing upon longevity in the Mollusca. On the 3rd of June, 1894, in company with Prof. Meldola, I found two living specimens of *Helix pomatia* at Newlands Corner, near Gomshall, Surrey. The snails were quite full grown, but I have no evidence of their age when taken. We kept them as pets, and fed them, when active, exclusively upon garden lettuce. They hybernated every year, by closing up the mouth of the shell with the secreted epiphragm, from October to about the end of March or beginning of April. One of the specimens was accidentally killed at the end of two years, but its companion is still alive and apparently quite healthy, judging from its weight, although now (November, 1899) in its winter sleep. Presuming the *Helix* was two years old when found, it is now at least $7\frac{1}{2}$ years old and I hope that it may live much longer.—B. G. Cole, Buckhurst Hill.

BOTANY.

PHANEROGAMIA.

Notes on Essex Plants.—*Valerianella auricula*, D.C. At pages 228–9 of vol. ix. Essex Naturalist, a new habitat (Coggeshall) for this plant is recorded. It may be of interest to give two more places where it has been recently found, more especially as I believe it had been apparently lost to the County Flora for nearly twenty years, the original locality (Walls of Colchester), as given in Gibson's *Flora*, not now furnishing specimens. One plant was found in a field at the Fennes, Bocking, in 1898, and several at Rayne in 1899, all the localities being corn-fields.

Bupleurum rotundifolium, *L.* occurs sparingly in corn-fields at Rayne. The nearest station given in Gibson's *Flora* is White Notley,

Lemna minor, *L.*; *L. polyrrhiza*, *L.*; and *L. gibba*, *L.*, were all found associated in one pond near Danbury, in August, 1899. This last is a rare and local species.—Edwin E. Turner, Coggeshall.

Epipactis latifolia Sw. [Bentham; *media* Fr. Bab.]—In a coppice the lower extremity of the wood (part of the old Hainault Forest), between Chigwell Row Church and the open plain at Lambourne End, on July 17th, 1899, flowers not quite open. On August 23rd I found three specimens in full bloom. On the latter day, Mr. S. Arthur Sewell was with me, and we verified the plants by Bentham and Sowerby.—(Rev.) ALFRED HUDDLE, M.A., Buckhurst Hill.

[In the small collection of plants gathered by J. Ray, of Epping' recently acquired for our Museum, are two specimens of *Epipactis* from Epping, labelled *latifolia*. Gibson gives both forms as occurring rarely in woods near Epping and Woodford, but Newbold remarks (*Flora*, p. 309), "as most, if not all, of the Cambridge stations for *E. latifolia* produce only *E. media*. the same may be the case in Essex."—ED.]

Rhamnus frangula, L., in Epping Forest.—This shrub I first found (at Mr. F. W. Elliott's station, E.N., x, 397) on June 7th, 1892. Strolling on August 25th, 1899, through Leyton Flats, from Eagle Pond towards Whipp's Cross, in the coppice where formerly I had found it, I counted 8 scattered specimens, varying from 4 to 10 feet high, and one isolated specimen (unfortunately cut down during a recent forest fire, but throwing up vigorous shoots) a furlong south-west of the coppice. The coppice runs parallel to the Snaresbrook Road, near the Eagle Pond.—(Rev.) ALFRED HUDDLE, M.A., Buckhurst Hill, October 25th, 1899.

The Old Yew Tree in Woodford Churchyard, Essex. During a correspondence in the London *Standard* in May last some interesting details were given of this old yew. In 1809, Dr. Hughson, in his *London*, stated that the tree was the largest within twelve miles of London, and measured 14 feet 3 inches round at four and a half feet from the ground, and that the spread of its branches covered a circle 180 feet in circumference. Mr. W. Bradbrooke, of Bletchley, said that in October, 1892, he found the Woodford yew to measure over 15 feet round and the spread of the branches to be about 150 feet. Mr. Henry Spring, of Woodford, gave the dimensions as 15 feet in girth at 2½ feet from the ground, and 18 feet girth at 5 up. He added "the Rector, the Rev. A. Hughes, informs me that there is a record that in the year 1816, when Woodford Church was re-built, the spread of the branches was 180 feet, and this is probably correct, judging from an old engraving of it. It is generally believed to be about 800 years old." Curiously enough, this tree is not mentioned in Warner's *Plantæ Woodfordienses*.

Practical Instruction in Botany in the London Parks.—An excellent suggestion has been made to utilise the parks of London for the teaching of practical botany in connection with elementary and secondary schools. It is proposed that plots of ground should be laid out and devoted to the cultivation, for school purposes, of hardy plants belonging to some twenty typical natural orders. The beds would be arranged near the paths, one bed being devoted to each order. A botanical guide to the parks might also be published, under the superintendence of the Technical Education Board and the Parks Committee jointly, and teachers would be enabled to obtain from the superintendent in each park such specimens as are required for botanical study in the schools, as far as they could be supplied without detriment to the plants themselves. The experiment is to be tried, and if later on it should prove to

be successful, arrangements might possibly be made to extend the cultivation of important types of the lower orders of plants, such as fungi, mosses, ferns, liverworts, &c., and also of aquatic plants. Battersea, Ravenscourt, and Victoria Parks have been selected for the first experiments, the total costs of which must not exceed £200. Battersea Park is already famous for its fine sub-tropical gardens, which are greatly appreciated by botanists.

FUNGI.

Notes on Microscopic Fungi.—*Æcidium leucospermum*, D.C., the *Anemone* Cluster-cup. As this species is stated to be rare in this country (Dr. M. C. Cooke writing, "we have found it but seldom, though often in search of it;" and Dr Plowright observing of it "rare in Britain") it may be of interest to record the species for Essex. It was found on leaves of *Anemone nemorosa*, in a wood near Witham, in May and June last. I believe that this is the first record for our county.

Puccinea betonicæ, Alb. and Schw. Betony Brand. This occurred to me on leaves of *Stachys betonica*, growing on a piece of waste land in the parish of Little Braxstead, in the month of June.—EDWIN E. TURNER, Coggeshall, Essex, July 5th, 1899.

New locality for *Polyporus umbellatus*, Fries.—Mr. E. W. Swanton writes in the *Journal of Botany* (vol. xxxvi., 399) to "place on record another locality for this rare and interesting fungus, hitherto only recorded from Epping Forest. A few days ago I received a specimen gathered from a wood at Inval, near Haslemere. This species is allied to *P. intybaceus* [which also occurs in Epping Forest] and differs in the numerous much-branched pileoli being circular and depressed; in *P. intybaceus* they are dimidiate."

PALÆONTOLOGY.

The New Fossil Bird (*Prophaëton shrubsolei*) from the London Clay.—The *Standard* of July 27th, 1899, had the following particulars of this interesting discovery:—"The British Museum (Natural History) has acquired a very interesting fossil bird, which was recently discovered in the Isle of Sheppy, enclosed in a large nodule of London Clay, by Mr. W. H. Shrubsole. The remains, consisting of skull, pelvis, thigh-bone, and shoulder-bone, have been carefully worked out of the clay matrix at the Museum, and determined by Mr. C. W. Andrews, B.Sc. of the Geological Department, to be a hitherto unknown form of the Order Steganopodes (now represented in this country by the Gannet, Cormorant, and Shag), in which all the four toes are united by a web. He believes that it was allied to the Frigate-birds, and more closely to the Tropic-bird, both of which are now practically confined to the tropical regions. There is, however, a striking difference in the size of the hind limbs, which are relatively much larger in the newly-discovered fossil than they are in the living Tropic-birds, in which, as in the Frigate-birds, they have undergone great reduction, owing to these species having abandoned the habits of diving and swimming common to other members of the order. The Frigate-birds are as great robbers as the Skuas, their chief victims being the Gannets, while the Tropic-birds are surface feeders, picking up fish that swim near the top of the water. But these birds spend most of

the time on the wing, and are rarely seen on land, so that, as a consequence of the hind limbs not being used for swimming or walking, they have degenerated. Mr. Andrews has called this new bird-form *Prophaëton shrubsolei*; the generic name records the fact that it stands in the line of descent of the modern Tropic-birds (the genus *Phaëton*), while the specific name is given in honour of the discoverer. This find is of considerable interest, for it is another proof of the change that has taken place in the climate of England since the early Eocene times, as is also evidenced by the fossil palm fruits from the same locality, and it adds one more steganopodous bird to our fossil fauna, which now contains four, the others being the Pelican, from the fens of East Anglia and the lake-dwellings at Glastonbury; *Odontopteryx*, with serrated jaws, like those of some tortoises; and *Argillornis*, both from the London Clay at Sheppy."

Fossils of the London Clay.—At a meeting of the Geologists' Association at Sheppey, on July 16th, 1898, (*Proc. Geol. Ass.* vol. xv., November, 1898, Mr. W. H. Shrubsole, F.G.S., who has done so much to elucidate the very obscure palæontology of the London Clay, gave some information concerning his own discoveries. The remarkable mineralised Diatoms[1] occurred in a zone (having a considerable range) near the base of the London Clay, and therefore only to be reached in Sheppey by deep excavation. *Radiolaria*[2] in a pyritised condition, had also been found in clay from a well near Queenboro' Railway Station. The only freshwater shells, *Camptoceras priscum*,[3] known to occur in the London Clay, he found in a septarian nodule. The skull and other portions of the skeleton of the toothed bird, *Argillornis longipennis*[4] were found at different times among the shingle on the beach, unobscured either by limestone or pyrites. The immense skull of *Chelone gigas*[5] (*Eosphargis gigas*) was enclosed in a septarian nodule, the outline of which furnished the only clue to something organic within. Interesting reference was made to its skilful exhumation at the British Museum, and the delights of Sir Richard Owen at finding such complete evidence of a gigantic Chelonian, the existence of which was foreshadowed forty years before by a small fragment of bone, on which the name has been bestowed.

The most recent discovery was the skull of another bird in 1897. Unlike the *Argillornis*, it was enclosed in a limestone nodule of oval form, at one end of which the base of the cranium was slightly exposed. The expert mason of the British Museum soon revealed what appears to be a perfect avian skull.[6]

GEOLOGY.

Sketch of the Geology of Ilford.—On May 13th last the Geologists' Association paid a visit to Ilford, that classic land for Essex palæontologists, under the direction of Mr. T. V. Holmes, F.G.S., who favoured the company with an interesting sketch of the geology of the district. This, by Mr. Holmes' kind permission, we are now able to reproduce. A visit was made to the

1 See *Journ. Royal Microscopical Soc.*, 1881.

2 See *Quart. Journ. Geol. Soc.*, vol. xlv, 1889, p. 121.

3 *Ibid.*, vol. xxxviii, 1882, p. 218.

4 *Ibid.*, vols. xxxiv. and xxxvi.

5 *Ibid.*, vol. xlv; *Cat. Fossil Reptilia, Brit. Museum*, part 3; Owens *Palæontology*, 2nd edition, pp. 317, 318.

6 See note on this fossil bird above.

Cauliflower Brickfield, the property of Mr. R. Page, where the pit exposed a section of 12 to 14 feet brick-earth above sand. Mr. Holmes remarked that the old river deposits of the Thames and its tributaries, on which they were standing, covered a broad belt of flat country lying between the alluvial flats bordering the Thames (which constituted the most recent river deposits) and the higher ground of London Clay north of Wanstead, Romford, and Upminster. The level of this tract varied from more than 100 feet above the sea, towards its northern limits, to 15 or 16 feet close to the marshes of the Thames between Barking and Rainham. Between London and Gravesend, as between Windsor and London, the Thames had not only been cutting its valley deeper and deeper, but had also been occupied in taking a more southerly course than it once followed. This was shown by the much greater breadth of river deposits to the north than to the south of the present stream. It should also be remembered that the fall of the river would make a deposit 60 or 70 feet above Ordnance Datum west of London, for example, the equivalent of a bed at a considerably lower level east of that city. Around the Ilford brick-pits the surface level is from 40 to 50 feet. But Thames Valley Gravel had been seen at a height of about 100 feet above O.D.,[1] on the new railway between Upminster and Romford, overlying the Chalky Boulder-Clay, the latest deposit of the Glacial period in that part of England. The Ilford deposits must therefore be still more decidedly "Post-Glacial" in the only sense in which the term can be used, that is in the sense of being more recent than the Chalky Boulder-Clay.

These old river-deposits consist of sand and gravel occasionally capped, as at Ilford, by a considerable thickness of loam or brick-earth. The gravel and sand has, doubtless, been brought down in the channel of the stream, while the brick-earth is inundation-mud, deposited above the sand and gravel during floods. Mammals would be especially liable to be drowned during floods, while at the same time their remains, when quietly buried in the comparatively impermeable mud, would have a much better chance of preservation than if brought down in the channel of the stream.

Mr. Holmes concluded his remarks by referring to the most important and interesting of the mammalian remains which had been found at Ilford by the late Sir Antonio Brady and others.[2] In answer to a question as to the origin of the curious steep-sided hollows, filled largely with other material, often seen near the surface of the Brick-earth, Mr. Holmes replied that they had probably originated in natural cracks, the result of drying and shrinking, which in many cases had been begun when the Brick-earth was being deposited. These had been enlarged by the action of the weather, and ultimately filled up with material at various periods and from a variety of sources.

Recrossing the railway, the party proceeded along the Romford road in a north-easterly direction. Passing the new Seven Kings Railway Station, they entered, by permission of the G. E. R. Company, the large ballast-pit on the northern side of the Romford road, about midway between Seven

1 *Quart. Journ. Geol. Soc.* vol. xlviii (1892), p. 365, and vol. l (1894), p. 443. ESSEX NAT. vol. iv, p. 143-149: and vol. vii, p. 1-14.

2 See Henry Walker, "A Day's Elephant Hunting in Essex." *Trans. Essex Field Club*, I., 27, and *Proc. E.F.C.*, I, xii, and "A Visit to Ilford," p. xxviii, Dr. H. Woodward. "The Ancient Fauna of Essex," *Trans. E.F.C.*, vol. iii, 1; Sir A. Brady, *Catalogue of the Pleistocene Vertebrata from the neighbourhood of Ilford, Essex*. London, 1874.

Kings and Chadwell Heath Stations. There they found 12 to 14 feet of Gravel capped by 3 or 4 feet of Brick-earth. The section was very fresh and clear, and the gravel was seen to be very well stratified and uniform in composition.[3]

MISCELLANEA.

The Countess of Warwick's Village Science School.—We have much pleasure in recording further progress in the conduct of this institution, the development of which is being followed with so much interest and hopeful expectation by the friends of scientific education throughout the country. The inauguration of the school at Bigods near Dunmow on July 29th, 1898, was commented upon in the last volume of the ESSEX NATURALIST (vol. x., p. 376). On Friday, July 28th last, a very large and distinguished company assembled at the School to celebrate the first annual prize distribution. Among the speakers were Sir John Gorst (*Vice-President of the Council of Education*), Sir John Donnelly, Mr. J. Round, M.P., Prof. Marshall Ward, F.R.S., Prof. Tilden, F.R.S., Mr. Bottomley, Prof. Teegan, Mrs. Brydges Adam and Mr. McCann. The speakers one and all commended the experiment as a praiseworthy attempt to solve a most difficult problem. Sir John Gorst's speech has attracted very considerable notice not only by reason of its importance as being the views of the leader of education in this country, but also because of the home-truths which he expressed in humorous and somewhat paradoxical language, as for instance when he said that in England "he did not think we were teaching the right things. He very gravely doubted whether reading, writing, and arithmetic and that most useless of all branches of knowledge, grammar—were exactly the intellectual food upon which to develop the intelligence of country lads and lasses." One great benefit to be derived from Lady Warwick's experiment is that her position thus assumed as a practical educationist is attracting a widespread interest in the problem of how to impart to children real instruction in science which will be useful to them in after life, while at the same time affording a good sound educational training. A pamphlet has been issued by Lady Warwick and Prof. Meldola, F.R.S. (who is so efficiently acting as her scientific adviser) entitled "A Plea for Secondary Rural Education" which all well-wishes of progress in village life should read. The authors sum up the case by saying "We known that our system is sound; we are confident that such pupils as we hope in time to turn out would sweep all before them if sent on to agricultural colleges. Our confidence rests upon the fact that from the beginning of the child's education to the end, the science subjects will never be dropped, but will be carried on the higher and higher stages." The kind of training given at Bigods is probably unique in experiments in elementary education in England. For the first time science is treated as an intregral part of the child's education, not as an "extra," to be taken up on sufferance and dropped at the first pretext.

Queen Elizabeth's Lodge and the Epping Forest Museum.—The news that the Corporation of London had voted a large sum towards the

3 References to the Geology of Ilford. Geological Survey Map, Sheet 1, S.W. Drift Edition. Dr. H. Woodward, *Record of Excursions*, Lond. Geol. Assn., p. 173 and *Proc. Geol. Assoc.*, vol. ii, p. 273. W. Whitaker, "The Geology of London," *Mem. Geol. Survey*, pp 410-415. B. B. Woodward, "The Pleistocene Mollusca of the London District, *Proc. Geol. Assoc.*, vol. xi, pp. 365-371, 388. A. S. Kennard and B. B. Woodward, "The Post-Pliocence Non-Marine Mollusca of Essex," ESSEX NAT. x, p. 103. F. C. Spurrell, "Excursion to Ilford," *Proc. Geol. Assoc.*, vol. xiii, p. 53.

restoration of the Lodge excited very considerable public interest and a large number of newspapers, as well metropolitan as provincial, took notice of the affair in paragraphs and short "leaders." As a specimen, a leader which appeared in the London *Daily Telegraph* may be quoted:—"That much-maligned body, the Corporation of London, acts as the custodian of many places of great historical interest in the immediate vicinity of the Metropolis, and its bitterest critics can find little fault with the way in which it carries out this important public trust. It is now engaged in restoring the famous Hunting Lodge at Chingford, which for the last few years has been the home of the Epping Forest Museum, so as to provide double the present accommodation for the Essex Field Club's exhibits. The intention is to reorganise the collection, and possibly supplement it with a loan of art objects, and thus make it, so to speak, an annexe of the museum now being erected at Stratford. The scheme is one that will commend itself to all antiquarians, and will greatly enhance the interest of the Hunting Lodge to the thousands who visit it year by year. Time has dealt very kindly with the fine old building, which takes its name from the Maiden Queen who constantly honoured it with her capricious presence when she hunted the hart in Epping Forest. Elizabeth, who had a strong taste for the classics, and more than the ordinary share of feminine vanity, delighted to hear her courtiers address her as Diana of the Woods, and there are portraits of her still extant in which she carries the bow of Artemis and is accompanied by her faithful hounds. But the Tudor Queen was a thoroughly good sportswoman, in spite of all her affectation, and even at the age of fifty-seven, she indulged in the pleasures of the chase. Local tradition, indeed, has it that she used to ride up the massive staircase at the Chingford Hunting Lodge to the great chamber above, and alight by the door at a raised place which for centuries has been known as 'the horse block.' The feat was successfully performed by a forester on an untrained pony seventy years ago, and the solid oak stairs, which are about six feet wide and run in fours, with six broad landings to the twenty-four steps, would still bear the weight of the heaviest charger. There is nothing impossible in the legend, therefore, and it is not at all improbable that the daughter of Henry VIII., who, in spite of her devotion to dress and her passion for colossal ruffs, farthingales, quiltings, slashings, and embroideries, could rap out tremendous oaths, and was so forgetful of strict etiquette as to box a courtier's ears and tickle the back of Leicester's neck when he knelt to receive his earldom, should show off her horsemanship by riding her palfrey up the staircase. The Lodge itself, with its gable ends, high-pitched roof, and old-fashioned fireplace in the basement, commanding a fine view across Epping Forest to High Beach and Buckhurst hill, makes an ideal museum, where the setting is as worthy of a visit as the exhibits themselves."

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The original documents relating to the foundation of the Club—the Rules, Prof. Meldola's Inaugural Address, and his first Presidential Address—insisted on the formation of a Local Museum and Library as a matter of first-class importance in the scheme of the society. After 20 years waiting, and in the dawn of the 20th century, these ideas will be realized, and in the two Essex Museums the Club will have institutions in which to house its collections second to few of like kind in the kingdom.

The gathering together of specimens and collections and appliance for their conservation has been vigorously carried on during the last few years, but an immense amount of work yet remains to be done. Above all things is required *Systematic Collecting* in various parts of the county. If more members would take up definite groups and endeavour to obtain *all the species in those groups* occurring in their districts, they would find the occupation a delightful and instructive one, and the results would be valuable not only to our Museums, but also in improving our County records, which are still so incomplete in many sections.

Gratifying aid could also be afforded by those having the means of obtaining isolated species, specimens of which are still unrepresented in our collections. I may particularly mention many BIRDS (coast species especially), and authenticated EGGS and NESTS; some species of MAMMALS, particularly the Bank Vole the Shrews, Dormouse, and Harvest Mouse. FISHES from the Essex rivers, and the more uncommon marine species. Many kinds of MARINE MOLLUSCA and CRUSTACEA. Some of our rarer ECHINODERMATA, POLYZOA and SPONGES, &c. INSECTS of many families are required, particularly HEMIPTERA, ORTHOPTERA, and HYMENOPTERA. Authentic specimens of FLOWERING PLANTS from several parts of the county are also desired, as well as LEAF FUNGI and LICHENS.

I am striving to supply deficiences, but our friends should remember that "many hands can make light work," and resolve to do their best to help during the memorable first year of the museum and the century. I shall be very glad to give full particulars as to any group, with hints on collecting, preservation, &c. Pending the removal of the Curator's Laboratory to the Museum, specimens should be sent to me at the temporary workrooms, 9, *Woodgrange Road, Forest Gate, Essex.*

December, 1899. WILLIAM COLE, *Curator.*

JOHN DUTTON, PRINTER, CHELMSFORD.